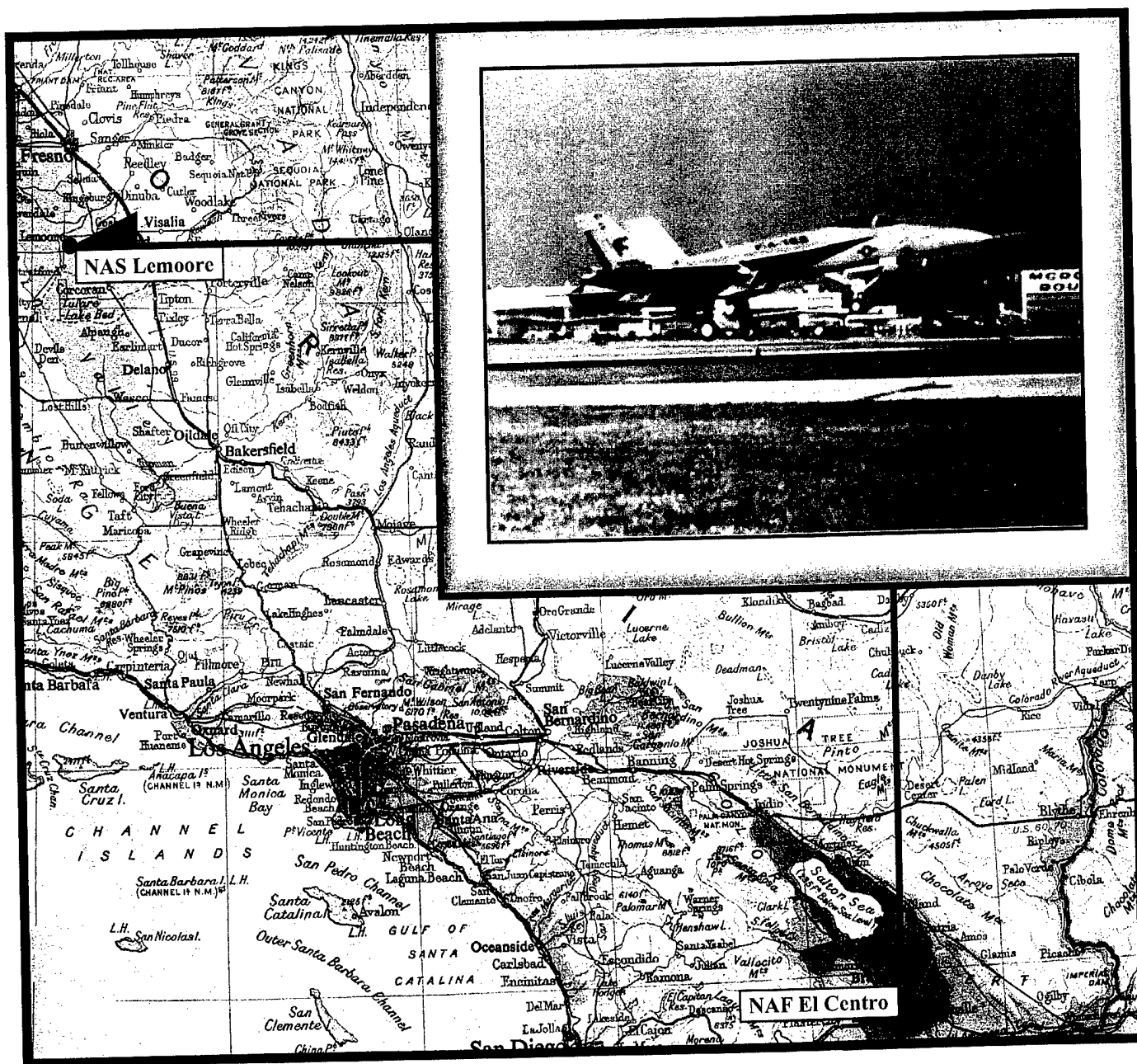


# Draft Environmental Impact Statement for Development of Facilities to Support Basing US Pacific Fleet F/A-18E/F Aircraft on the West Coast of the United States

## Technical Appendices

Volume II



December 1997

Department of the Navy  
F/A-18E/F Fleet Introduction Team

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**Draft Environmental Impact Statement for Development of  
Facilities to Support Basing US Pacific Fleet F/A-18E/F  
Aircraft on the West Coast of the United States**

**Volume II  
Technical Appendices**

U.S. Navy  
Engineering Field Activity West  
900 Commodore Drive  
San Bruno, California 94066

December 1997

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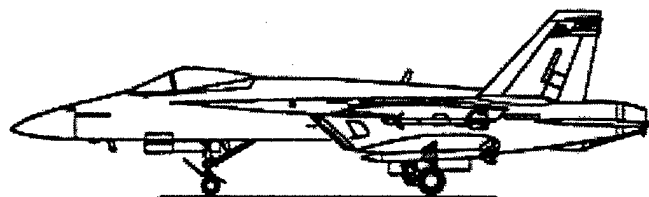
**Draft Environmental Impact Statement for  
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APPENDIX A  
PUBLIC INVOLVEMENT

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# APPENDIX A

## PUBLIC INVOLVEMENT

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### A.1 OVERVIEW

As discussed in Section 1.5, Public Involvement Process of this document, the NEPA process is designed to involve the public in the decision-making process. This appendix contains copies of the public involvement materials used to inform federal, state, and local agencies, elected officials, organizations, and individuals about the preparation of this document.

A scoping letter and project summary was distributed to announce the Navy's intent to prepare this EIS, the start of the public scoping period, the dates and locations of the public scoping meetings, and the address and deadline to provide scoping comments. A notice of intent (NOI) was published in the Federal Register on April 7, 1997 (Volume 62, Number 66). A copy of the NOI is provided in this appendix. The NOI was published in four local newspapers, the Hanford Sentinel, Fresno Bee, Imperial Valley Press, and Oxnard Star. A sample newspaper advertisement and the dates of publication are provided in this appendix.

### A.2 SUMMARY OF SCOPING COMMENTS

Written and oral comments received during the EIS scoping process are summarized below for the three proposed alternative sites. Oral comments were received at the three scoping meetings held in the City of Lemoore on April 28, 1997, the City of El Centro on April 29, 1997, and the City of Camarillo of April 30, 1997. The scoping process ended May 23, 1997. A Summary of the issues identified through the scoping process is provided below.

#### ***NAS Lemoore (Location of scoping meeting: City of Lemoore)***

Some of the comment letters were expressing support for or opposition to the proposed action at NAS Lemoore. Specific areas of concern related to the environmental impact statement included biological resources, land use and airspace, noise, public health and safety, and the general NEPA processes.

#### ***NAF El Centro (Location of scoping meeting: City of El Centro)***

Some of the comment letters expressed support for or opposition to the proposed action at NAF El Centro. Specific areas of concern related to the environmental impact statement included biological resources and noise.

[Federal Register: April 7, 1997 (Volume 62, Number 66)]  
[Notices]  
[Page 16563-16564]  
From the Federal Register Online via GPO Access [wais.access.gpo.gov]  
[DOCID:fr07ap97\_dat-47]

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## DEPARTMENT OF DEFENSE

## Department of the Navy

Notice of Intent To Prepare an Environmental Impact Statement for  
the Proposed West Coast Introduction of the F/A-18 E/F Aircraft

SUMMARY: Pursuant to Section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969 as implemented by the Council on Environmental Quality regulations (40 CFR Parts 1500-1508), the Department of the Navy announces its intent to prepare an Environmental Impact Statement (EIS) to evaluate the environmental impacts of the West Coast introduction of F/A-18 E/F aircraft, associated functional and administrative components, and associated military personnel. Naval Air Station (NAS) Lemoore, Naval Air Weapons Station (NAWS) Pt. Mugu, and Naval Air Facility (NAF) El Centro, California are proposed as potential basing locations.

This process involves retiring older aircraft from active use and incorporating the new F/A-18 E/F into service. The new aircraft will continue to support operations of the U.S. Pacific Fleet.

Major environmental issues addressed in the EIS will include, but are not limited to, air space, operational training capability, socioeconomic and environmental justice impacts, air quality, noise, endangered species, cultural resources, traffic, local infrastructure impacts, and cumulative impacts.

ADDRESSES: The Navy will initiate a scoping process for the purpose of determining the scope of issues to be addressed and for identifying the significant issues related to this action. The Navy will hold public scoping meetings on Monday, April 28, 1997 at 7 p.m. at the Lemoore High School Cafeteria, 101 East Bush Street, Lemoore, California; on Tuesday, April 29, 1997 at 7 p.m. at the Imperial County Board of Supervisors Office, 940 West Main Street, El Centro, California; and on Wednesday, April 30, 1997 at 7 p.m. in the Bougainvillea Room, Orchid Professional Building, 816 Camarillo Springs Road, Camarillo, California. A brief presentation will precede a request for public comments. Navy representatives will be available at this meeting to receive comments from the public regarding information on issues of concern. It is important that federal, state, and local agencies and interested individuals take this opportunity to provide information or identify environmental concerns that should be addressed during the preparation of the EIS. In the interest of available time, each speaker will be asked to limit oral comments to five minutes.

Agencies and the public are also invited and encouraged to provide written comments in addition to, or in lieu of, oral comments at the public meeting. To be most helpful, scoping comments should clearly describe specific issues or topics which the commenter believes the EIS should address.

## FOR FURTHER INFORMATION CONTACT:

Written statements and/or questions regarding the scoping process

should be mailed to: Commanding Officer, Engineering Field Activity West, Naval Facilities Engineering Command, 900 Commodore Drive, San Bruno, CA 94066-5006 (Attention: Mr. Surinder Sikand, Code 18511), telephone (415) 244-3020, fax (415) 244-3737. All

[[Page 16564]]

comments must be received no later than May 23, 1997.

Dated: April 1, 1997.

D.E. Koenig,

LCDR, JAGC, USN, Federal Register Liaison Officer.

[FR Doc. 97-8720 Filed 4-4-97; 8:45 am]

BILLING CODE 3810-FF-M

5090.1B  
1851SU/EP-1254  
11 April 1997

**SUBJECT:** Notice of Scoping of Public Concerns Regarding an Environmental Impact Statement (EIS) for the Proposed West Coast Basing of the F/A-18 E/F Aircraft and Associated Fleet Readiness and Fleet Operational Squadrons

Dear Interested Party,

This letter is to notify you of a public meeting to identify environmental issues that should be considered regarding the assignment of 92 F/A-18 E/F aircraft and 1550 personnel to a West Coast Navy installation. Naval Air Station (NAS) Lemoore, California, Naval Air Weapons Station (NAWS) Point Mugu, California, and Naval Air Facility (NAF) El Centro, California, have been identified as potential basing locations. Additional operational, training, maintenance, storage, administrative, housing, community, and utility facilities will be required to support the basing. A summary of the project and installation characteristics is included as an attachment to this letter.

In accordance with the National Environmental Policy Act (NEPA), the Department of the Navy is preparing an environmental impact statement (EIS) to identify and evaluate any potential individual and cumulative effects of the proposed action. The EIS proposed action is the basing of the aircraft, related facilities, and personnel at a West Coast Navy installation. The EIS will evaluate project impacts at the three identified installations at an equal level of detail and include a No Action Alternative as required by NEPA. The Navy will use the EIS in its consideration of options for basing the F/A-18 aircraft and personnel. The EIS is intended to provide decisionmakers, responsible agencies, and the public with adequate information on potential significant environmental impacts to make informed choices about Navy actions.

As a starting point in the EIS process, the Navy is conducting public scoping, pursuant to Section 102(2)(c) of NEPA as implemented by the Council on Environmental Quality regulations (40 CFR Parts 1500-1508). The Navy has scheduled a public meeting at each of the installations under consideration to receive the F/A-18 E/F aircraft. At each meeting, Navy representatives will be available to receive comments from the public regarding environmental issues of concern. A brief presentation will precede a request for public comment. In the interest of time, speakers will be asked to limit their oral comments to five minutes. Comment forms also will be available to submit written comments at these meetings. The schedule for these meetings is as follows:

DATE:	April 28, 1997
LOCATION:	Lemoore High School Cafeteria, 101 East Bush Street Lemoore California
TIME:	7:00 p.m.
DATE:	April 29, 1997
LOCATION:	Imperial County Board of Supervisors Office, 940 West Main Street El Centro, California
TIME:	7:00 p.m.

DATE: April 30, 1997  
LOCATION: Orchid Professional Building Bougainvillea Room, 816 Camarillo Springs Road  
Camarillo, California  
TIME: 7:00 p.m.

In addition to attending the meetings, the public is encouraged to express their concerns regarding the proposed action or EIS by sending letters, faxes, or email to the following address:

Commanding Officer  
Engineering Field Activity West  
Naval Facilities Engineering Command  
900 Commodore Drive  
San Bruno, CA 94066-5006  
Attn: Mr. Surinder Sikand, Code 18511

Email: [sssikand@efawest.navy.mil](mailto:sssikand@efawest.navy.mil)  
Fax: 415-244-3737

Affected federal, state and local agencies, and other interested groups and individuals are also invited to submit written comments to the above address. Comments must be received by May 23, 1997, to be incorporated into the scoping process. Unless you note otherwise, you will be added to the mailing list to receive future information on this EIS upon response to this scoping request. Thank you for your participation in our public involvement and scoping process.

John H. Kennedy  
Head, Environmental Planning Branch  
Sam Dennis  
Program Manager, Environmental Planning Branch

## Proposed West Coast Basing of the F/A-18 E/F Aircraft and Associated Fleet Readiness and Fleet Operational Squadrons Project Description

### Introduction

The proposed project includes basing new F/A-18 E/F aircraft and personnel and expanding facilities to maintain aircraft and personnel and provide the associated training functions. Installations under consideration include Naval Air Station (NAS) Lemoore, Naval Air Facility (NAF) El Centro, and Naval Air Weapons Station (NAWS) Point Mugu. Approximately 92 aircraft and 1550 personnel would be based at the receiving installation, necessitating facilities for aircraft operations, training, aircraft maintenance, administration, housing, community activities, and utilities. In addition to the increased staffing and equipment levels, the project would increase Navy activity and change flight operations at the receiving installation.

### Project Components

#### *F/A-18 E/F Aircraft*

The 92 new F/A-18 E/F aircraft are designed to replace older aircraft currently operating in the Navy fleet from both land bases and aircraft carriers throughout the world. Many of the aircraft based on the West Coast are among those that require replacement. These aircraft need to remain on the West Coast to provide for a balance in the force structure and to be near aircraft carriers stationed on the West Coast.



#### *Personnel*

Approximately 1550 personnel, consisting of military and civilian staff, would be associated with the aircraft assignment. These personnel would operate, test, maintain, and repair the aircraft and aircraft components and perform administrative functions related to the F/A-18 program.

#### *Facilities*

Facilities would be required to house, maintain, and repair aircraft; test aircraft components; store ordnance; house additional personnel; and serve as administrative space for new programs. The installation facilities also must be capable of absorbing the additional flight operations and the training schedules of the fleet squadrons.

#### *Operational/Training Requirements*

Some key features required for operation of the F/A-18 E/F aircraft include airspace for field carrier practice patterns, dual parallel runways, and nearby training ranges. Data for existing F/A-18 operations indicate that approximately 140,000 additional operations would be generated each year under the proposed action. This includes field carrier landing practice, 90 percent of which must be conducted at the basing installation.

## Potential Receiving Installations

### *NAS Lemoore*

NAS Lemoore contains 18,784 acres of Navy-owned land and 11,039 acres of easements in the Central San Joaquin Valley, California. The 29,823-acre base is situated approximately 80 miles inland from the Pacific Ocean and halfway between Los Angeles and Sacramento. The closest large urban center is Fresno, located approximately 35 miles to the northeast.

Currently, the NAS Lemoore airfield supports on average 100 flights per day and approximately 40,840 FCLP exercises annually. The base is home to 179 F/A-18 A, B, C, and D aircraft and an overall workforce of 6,831 people comprised of 5,026 military and 1,805 civilian personnel. Training exercises are conducted in the NAS Lemoore airspace, other ranges in California and Nevada, and the air/sea training ranges off the California coast.

Basing 92 aircraft at NAS Lemoore would require some new facilities and upgrades to existing facilities. Many of the required facilities are available at NAS Lemoore necessitating primarily renovation or adaptation for the F/A-18 E/F aircraft. Housing at NAS Lemoore is currently near capacity; therefore, construction of some housing could be required for new personnel.

### *NAF El Centro*

NAF El Centro is located in California's Imperial Valley, approximately 120 miles east of San Diego and the Pacific Ocean. The city of El Centro, the county seat of Imperial County, is approximately 7 miles east of the installation. The facility is located approximately 12 miles north of the US-Mexico border. The installation occupies approximately 2,327 acres, a portion of which is leased out under an agricultural lease-out program.

The airfield contains four runways, which support nearby target practice exercises. There are three weapons ranges in the vicinity of NAF El Centro: Chocolate Mountains Gunnery Range, Target 103A Parachute Drop Area, and Targets 68 and 85. NAF El Centro is home to the fixed wing aircraft belonging to the CNATRA Strike Detachment and Strike Fighter Wing Pacific Detachment. Several transient units use NAF El Centro facilities during winter training periods, including the Navy's Flight Demonstration Squadron, the Blue Angels.

Basing 92 aircraft at NAF El Centro would require construction of several new facilities and upgrades to existing facilities. Many of the facilities available at NAF El Centro would require extensive upgrades for the F/A-18 E/F aircraft. The runways at El Centro would require reconfiguration to accommodate the F/A-18 E/F aircraft. Since housing at NAF El Centro is also currently near capacity, construction of some housing could be required for new personnel.

### *NAWS Point Mugu*

NAWS Point Mugu is located in southern Ventura County, approximately 7 miles southeast of Oxnard, California. The installation occupies approximately 4,575 acres, along the coast of the Pacific Ocean.

The airfield at NAWS Point Mugu supports approximately 110 flights per day and 240 FCLP exercises annually. The base has an overall workforce of approximately 7,800 personnel, including approximately 4,400 military personnel and 3,400 civilian contractors.

Basing 92 aircraft at NAWS Point Mugu would require several new facilities and upgrades to existing facilities. Many of the facilities available at NAWS Point Mugu would require extensive upgrades for the F/A-18 aircraft. Since housing at NAWS Point Mugu is also currently near capacity, construction of some housing could be required for new personnel. The incoming squadrons would train in nearby ranges. Aircraft would perform FCLP training at an outlying field, such as San Clemente Island or San Nicolas Island.

### NEWSPAPER ADVERTISEMENT

The newspaper advertisement on the following page announced the preparation of the West Coast Basing of the F/A-18E/F Aircraft EIS, and the start of the public scoping process. The advertisement was published in the following papers

The Imperial Valley Press - Monday, April 28, 1997 and Tuesday, April 29, 1997.

The Fresno Bee - Monday, April 28, 1997 and Tuesday, April 29, 1997.

The Hanford Sentinel - Monday, April 28, 1997 and Tuesday, April 29, 1997.

The Oxnard Star- Monday, April 28, 1997 and Tuesday, April 29, 1997.

Imperial Valley Press

Monday, April 28, 1997

**NOTICE OF INTENT**

Department of the Navy

**Intent to Prepare an Environmental Impact Statement  
For the Proposed West Coast Introduction of the F/A-18 E/F Aircraft and  
Associated Fleet Readiness and Fleet Operational Squadrons**

Pursuant to Section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969 as implemented by the Council on Environmental Quality regulations (40 CFR Parts 1500-1508), the Department of the Navy announces its intent to prepare an Environmental Impact Statement (EIS) to evaluate the environmental impacts of the West Coast assignment of F/A-18 E/F aircraft. Homeporting Fleet Replacement Squadrons, four Fleet Squadrons, and associated military personnel, and constructing and upgrading utilities and facilities, such as operations, training, maintenance, administrative, housing, and community facilities, are being evaluated. Naval Air Station (NAS) Lemoore, California, Naval Air Weapons Station (NAWS) Point Mugu, California, and Naval Air Facility (NAF) El Centro, California, will be evaluated as potential homeporting locations. At this point, NAS Lemoore has been identified as the Preferred Alternative. However, all sites will receive equal consideration in the evaluation.

This process involves retiring older aircraft from Navy use and incorporating new F/A-18 E/F aircraft into service. Many of the aircraft based on the West Coast are among those that require replacement. For operational reasons, these aircraft need to remain on the West Coast to provide a balance in the force structure and to be near aircraft carriers stationed on the West Coast.

Aircraft training operations at the three shore activities are being evaluated for potential expansion as a result of this proposed action. Evaluation of potentially significant issues, such as adequacy of air space, clean air conformity analyses, impacts on local infrastructure, and noise analysis, may be necessary depending upon coordination with other federal, state, and local agencies. Findings from other detailed studies conducted during the EIS process also will be incorporated.

Additional airspace analyses are being conducted to identify alternative scenarios for the increased aircraft operations. Impacts associated with the additional aircraft, facilities, and personnel, along with any other proposed federal actions in the region around NAS Lemoore, NAWS Point Mugu, and NAF El Centro, will be considered in the cumulative analysis. Major environmental issues addressed in the EIS will include, but are not limited to, air space, operational training capability, socioeconomic and environmental justice factors, air quality, noise, endangered species, cultural resources, traffic, and local infrastructure.

The Navy will initiate a scoping process for the purpose of determining the scope of issues to be addressed and for identifying the significant issues related to this action. The Navy will hold public scoping meetings on:

April 28, 1997 at 7:00 p.m.  
Lemoore High School  
Cafeteria  
101 East Bush Street  
Lemoore, California

April 29, 1997 at 7:00 p.m.  
Imperial County  
Board of Supervisors Office  
940 West Main Street  
El Centro, California

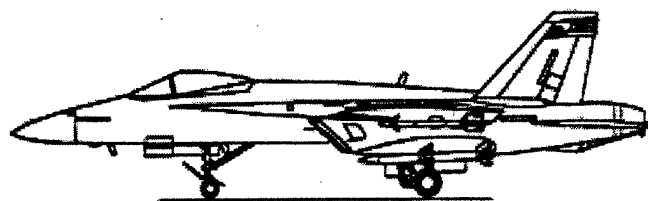
April 30, 1997 at 7:00 p.m.  
Orchid Professional Building  
Bougainvillea Room  
816 Camarillo Springs Road  
Camarillo, California

A brief presentation will precede a request for public comment. Navy representatives will be available at this meeting to receive comments from the public regarding information on issues of concern to the public. It is important that federal, state, and local agencies and interested individuals take this opportunity to provide information or identify environmental concerns that should be addressed during the preparation of the EIS. In the interest of the available time, each speaker will be asked to limit his or her oral comments to five minutes. Comment forms also will be available to submit written comments at these meetings.

Agencies and the public also are invited and encouraged to provide written comments in addition to, or in lieu of, oral comments at the public meeting. To be most helpful, scoping comments should clearly describe specific information, data, issues, or topics that the commentator believes the EIS should address. Written statements and or questions regarding the scoping process must be received no later than May 23, 1997, and should be mailed to:

Commanding Officer  
Engineering Field Activity West  
Naval Facilities Engineering Command  
900 Commodore Drive  
San Bruno, CA 94066-5006  
Attn: Mr. Surinder Sikand, Code 18511  
Telephone: 415 244 3020  
FAX: 415 244 3737  
Email: sssikand@efawest.navy.mil

Paid Advertisement



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## APPENDIX B SOCIOECONOMICS

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B.1	OVERVIEW	B-1
	EIFS MODEL RESULTS FOR NAS LEMOORE	B-4
	EIF MODEL RESULTS FOR NAF EL CENTRO	B-29

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## APPENDIX B

### SOCIOECONOMICS

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#### B.1 OVERVIEW

The assessment of socioeconomic impacts resulting from Navy actions can be one of the most controversial issues related to the realignment, closure or modification of an installation. The economic and social well-being of a community can be dependent upon the activities of the installation, and disruptions to the status quo become politically charged and emotion-laden. The objective of a socioeconomic analysis of Navy actions is an open, realistic, and documented assessment of the potential effects.

The requirement to assess socioeconomic impacts in EAs or EISs has been a source of legal discussion since the passage of the National Environmental Policy Act (NEPA). While NEPA is predominately oriented toward the biophysical environment, court decisions have supported the need for analysis of socioeconomic impacts when they are accompanied by biophysical impacts.

#### ***Economic Impact Forecast System (EIFS)***

The US Army developed the Economic Impact Forecast System (EIFS) with the assistance of many academic and professional economists and regional scientists to address economic impacts and to measure their significance. As a result of its applicability and in the interest of uniformity, EIFS is mandated by ASA (IL&E) for use in NEPA assessment for base realignments and closure. The entire system is designed for the scrutiny of a populace affected by the actions being studied. The algorithms in EIFS are simple and easy to understand but still have firm, defensible bases in regional economic theory.

EIFS is included as one of the tools of the Environmental Technical Information System (ETIS) and is implemented as an on-line service supported by USACERL through the University of Illinois. The system is available to anyone with an approved login and password and is available at all times through toll-free numbers,

Telnet, and other commonly-used communications. The ETIS Support Center at the university and the staff of USACERL are available to assist with the use of EIFS.

The data bases in EIFS are national in scope and cover the approximately 3,700 counties, parishes and independent cities recognized by federal agencies as reporting units. EIFS allows the user to define an economic region of influence (ROI) by simply identifying the counties that are to be analyzed. Once the ROI is defined, the system aggregates the data, calculates multipliers and other variables used in the various models in EIFS, and prompts the user for input data.

### ***The EIFS Impact Models***

The basis of the EIFS analytical capabilities is the calculation of multipliers that are used to estimate the impacts resulting from Navy-related changes in local expenditures and/or employment. In calculating the multipliers, EIFS uses the economic base model approach that relies on the ratio of total economic activity to basic economic activity. Basic, in this context, is defined as the production or employment to supply goods and services outside the ROI or by federal activities (such as military installations and their employees). According to economic base theory, the ratio of total income to basic income is measurable (as the multiplier) and sufficiently stable so that future changes in economic activity can be forecast. This technique is especially appropriate for estimating aggregate impacts and makes the economic base model ideal for the EA/EIS process.

The multiplier is interpreted as the total impact on the economy of the region resulting from a unit change in its basic sector for example, a dollar increase in local expenditures due to an expansion of its military installation. EIFS estimates its multipliers using a location quotient approach based on the concentration of industries within the region relative to the concentration of industries in the nation.

EIFS has models for three basic military activity scenarios: standard, construction, and training. The user selects a model to be used and inputs those data elements into the selected model that describe the Army action: civilian and military to be moved and their salaries and the local procurement associated with the activity being relocated. Once these are entered into the system, a projection of changes in the local economy is provided. These are projected changes in sales volume, employment, income, and population. These four indicator variables are used to measure and evaluate socioeconomic impacts.

### ***The Evaluation of Socioeconomic Impacts***

Under NEPA, there are no established thresholds in determining whether a socioeconomic impact is significant or not. Once model projections are obtained, the Rational Threshold Value (RTV) profile allows the reader to evaluate the context and intensity of the impacts. This analytical tool reviews the historical trends for the defined region and develops measures of local historical fluctuations in sales volume, employment, income, and population. These evaluations indicate the intensity of the positive and negative changes of a project.

The RTV provides boundaries (threshold values) to assess the magnitude of an action's impacts. The largest historical change (both increase and decrease) maps out the boundaries. These values provide a basis for comparing an action's impact to the historical fluctuation in a particular area. Therefore, the assignment of thresholds is made on an individual basis. Specifically, EIFS sets the boundaries by multiplying the maximum historical deviation of:

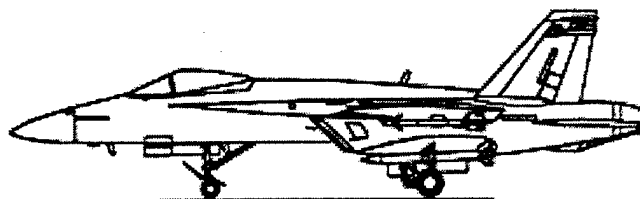
		<u>Increase</u>	<u>Decrease</u>
Business volume	x	100%	75%
Personal income	x	100%	67%
Total employment	x	100%	67%
Total population	x	100%	50%

The percentage allowances are arbitrary but sensible. The maximum positive historical fluctuation is expressed with expansion because of the positive connotations of economic growth. While cases of damaging economic growth have been cited and although the zero-growth concept is being accepted by many local planning groups, the effects of reductions and closures generally are much more controversial than expansions.

The major strengths of the RTV criteria is that it is specific to the region under analysis and it is based on actual historical time series data for the defined region. The use of EIFS impact models in combination with the RTV has proven very successful in addressing perceived socioeconomic impacts. The EIFS model and the RTV technique for measuring significance are theoretically sound and have been reviewed on numerous occasions.

The severity of conceivable impacts accelerates in the following order: total business volume, total personal income, total employment, and total population. Business volume impacts may be alleviated by manipulation of such variables as inventory and new equipment. Impacts on workers or proprietors are not easily or immediately assessed. Changes in employment and income are of primary interest. Employment and income impacts are followed by changes in personal income, directly affecting individuals within the region. Population threshold indicators are extremely important because they reflect the effects on local government revenues, housing, education, infrastructure, and other social services. They should be weighted accordingly.

The following pages contain the EIFS input and output data for the proposed realignment action. This data forms the basis for the socioeconomic impact analysis presented in Section 4.4.



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## EIFS Model Results for NAS Lemoore

# **RATIONAL THRESHOLD VALUES**

**NAS Lemoore**

**Kings and Fresno Counties (aggregated)**

All dollar amounts are in thousands of dollars.

Dollar adjustment based on Consumer Price Index (1987=100).

## **POPULATION**

YEAR	Population	change	deviation	%deviation
1969	473,900			
1970	481,500	7,600	-7,143	-1.507 %
1971	491,200	9,700	-5,043	-1.047 %
1972	500,100	8,900	-5,843	-1.190 %
1973	508,200	8,100	-6,643	-1.328 %
1974	519,000	10,800	-3,943	-0.776 %
1975	534,800	15,800	1,057	0.204 %
1976	548,900	14,100	-643	-0.120 %
1977	561,500	12,600	-2,143	-0.391 %
1978	571,200	9,700	-5,043	-0.898 %
1979	579,900	8,700	-6,043	-1.058 %
1980	591,500	11,600	-3,143	-0.542 %
1981	606,100	14,600	-143	-0.024 %
1982	622,100	16,000	1,257	0.207 %
1983	640,400	18,300	3,557	0.572 %
1984	659,100	18,700	3,957	0.618 %
1985	674,600	15,500	757	0.115 %
1986	686,600	12,000	-2,743	-0.407 %
1987	705,100	18,500	3,757	0.547 %
1988	730,500	25,400	10,657	1.511 %
1989	752,700	22,200	7,457	1.021 %
1990	773,700	21,000	6,257	0.831 %
1991	795,000	21,300	6,557	0.847 %
1992	813,000	18,000	3,257	0.410 %

average yearly change:	14,743
maximum historic positive deviation:	10,657
maximum historic negative deviation:	-7,143
maximum historic % positive deviation:	1.511 %
maximum historic % negative deviation:	-1.507 %
positive rtv:	1.511 %
negative rtv:	-0.754 %

# **RATIONAL THRESHOLD VALUES**

**NAS Lemoore**

**Kings and Fresno Counties (aggregated)**

All dollar amounts are in thousands of dollars.

Dollar adjustment based on Consumer Price Index (1987=100).

## **EMPLOYMENT**

YEAR	Employment	change	deviation	%deviation
1969	202,756			
1970	207,326	4,570	-3,482	-1.717 %
1971	213,273	5,947	-2,105	-1.015 %
1972	225,804	12,531	4,479	2.100 %
1973	235,285	9,481	1,429	0.633 %
1974	246,823	11,538	3,486	1.482 %
1975	253,391	6,568	-1,484	-0.601 %
1976	261,720	8,329	277	0.110 %
1977	270,839	9,119	1,067	0.408 %
1978	282,692	11,853	3,801	1.404 %
1979	301,522	18,830	10,778	3.813 %
1980	308,427	6,905	-1,147	-0.380 %
1981	311,674	3,247	-4,805	-1.558 %
1982	313,260	1,586	-6,466	-2.074 %
1983	321,133	7,873	-179	-0.057 %
1984	328,264	7,131	-921	-0.287 %
1985	331,832	3,568	-4,484	-1.366 %
1986	334,838	3,006	-5,046	-1.521 %
1987	346,463	11,625	3,573	1.067 %
1988	361,091	14,628	6,576	1.898 %
1989	372,667	11,576	3,524	0.976 %
1990	386,894	14,227	6,175	1.657 %
1991	389,311	2,417	-5,635	-1.456 %
1992	387,941	-1,370	-9,422	-2.420 %

average yearly change:	8,052
maximum historic positive deviation:	10,778
maximum historic negative deviation:	-9,422
maximum historic % positive deviation:	3.813 %
maximum historic % negative deviation:	-2.420 %
positive rtv:	3.813 %
negative rtv:	-1.621 %

# **RATIONAL THRESHOLD VALUES**

**NAS Lemoore**

**Kings and Fresno Counties (aggregated)**

All dollar amounts are in thousands of dollars.

Dollar adjustment based on Consumer Price Index (1987=100).

## **BUSINESS VOLUME (using Non-Farm Income)**

YEAR	Non-Farm income	adjusted income	change	deviation	%deviation
1969	1,117,431	3,306,009			
1970	1,205,517	3,367,366	61,357	-95,374	-2.885 %
1971	1,322,519	3,545,627	178,261	21,530	0.639 %
1972	1,486,422	3,850,834	305,207	148,476	4.188 %
1973	1,676,472	4,088,956	238,122	81,390	2.114 %
1974	1,880,283	4,132,490	43,534	-113,197	-2.768 %
1975	2,084,751	4,194,670	62,180	-94,552	-2.288 %
1976	2,354,448	4,484,663	289,993	133,261	3.177 %
1977	2,631,046	4,706,701	222,038	65,307	1.456 %
1978	3,008,945	4,998,247	291,546	134,815	2.864 %
1979	3,464,338	5,170,654	172,406	15,675	0.314 %
1980	3,777,357	4,963,676	-206,978	-363,710	-7.034 %
1981	4,052,859	4,830,583	-133,093	-289,824	-5.839 %
1982	4,197,224	4,721,287	-109,296	-266,027	-5.507 %
1983	4,511,902	4,925,657	204,371	47,639	1.009 %
1984	4,916,035	5,185,691	260,033	103,302	2.097 %
1985	5,215,622	5,316,638	130,947	-25,784	-0.497 %
1986	5,521,963	5,722,241	405,603	248,872	4.681 %
1987	6,033,555	6,033,555	311,314	154,582	2.701 %
1988	6,492,620	6,242,904	209,349	52,617	0.872 %
1989	7,112,777	6,525,483	282,580	125,848	2.016 %
1990	7,835,348	6,831,167	305,683	148,952	2.283 %
1991	8,212,027	6,877,744	46,578	-110,154	-1.613 %
1992	8,486,501	6,910,831	33,087	-123,645	-1.798 %

average yearly change:	156,731
maximum historic positive deviation:	248,872
maximum historic negative deviation:	-363,710
maximum historic % positive deviation:	4.681 %
maximum historic % negative deviation:	-7.034 %
positive rtv:	4.681 %
negative rtv:	-5.276 %

# **RATIONAL THRESHOLD VALUES**

**NAS Lemoore**

**Kings and Fresno Counties (aggregated)**

**All dollar amounts are in thousands of dollars.**

**Dollar adjustment based on Consumer Price Index (1987=100).**

## **PERSONAL INCOME**

YEAR	Personal income	adjusted income	change	deviation	%deviation
1969	1,668,472	4,936,308			
1970	1,834,571	5,124,500	188,192	-63,443	-1.285 %
1971	1,979,113	5,305,933	181,433	-70,203	-1.370 %
1972	2,223,148	5,759,451	453,518	201,882	3.805 %
1973	2,545,547	6,208,651	449,200	197,565	3.430 %
1974	3,040,132	6,681,609	472,958	221,322	3.565 %
1975	3,233,169	6,505,370	-176,239	-427,874	-6.404 %
1976	3,785,360	7,210,210	704,839	453,204	6.967 %
1977	4,005,609	7,165,669	-44,541	-296,176	-4.108 %
1978	4,399,184	7,307,615	141,946	-109,690	-1.531 %
1979	5,352,613	7,988,975	681,360	429,725	5.881 %
1980	6,265,749	8,233,573	244,598	-7,037	-0.088 %
1981	6,429,576	7,663,380	-570,193	-821,829	-9.981 %
1982	6,749,976	7,592,774	-70,606	-322,242	-4.205 %
1983	6,887,462	7,519,063	-73,710	-325,346	-4.285 %
1984	7,736,451	8,160,813	641,750	390,114	5.188 %
1985	8,292,046	8,452,646	291,833	40,198	0.493 %
1986	8,800,766	9,119,965	667,318	415,683	4.918 %
1987	9,642,581	9,642,581	522,616	270,981	2.971 %
1988	10,211,036	9,818,304	175,723	-75,913	-0.787 %
1989	11,163,668	10,241,897	423,593	171,958	1.751 %
1990	12,150,402	10,593,202	351,304	99,669	0.973 %
1991	12,457,405	10,433,337	-159,864	-411,500	-3.885 %
1992	13,168,980	10,723,925	290,587	38,952	0.373 %

average yearly change:	251,636
maximum historic positive deviation:	453,204
maximum historic negative deviation:	-821,829
maximum historic % positive deviation:	6.967 %
maximum historic % negative deviation:	-9.981 %
positive rtv:	6.967 %
negative rtv:	-6.688 %

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 E/F at NAS Lemoore (1999)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2  
 Change in expenditures for local services and supplies: \$107,500  
 Change in civilian employment: 120  
 Average income of affected civilian personnel: \$30,861  
 Percent expected to relocate: 0.0 percent  
 Change in military employment: 167  
 Average income of affected military personnel: \$37,230  
 Percent of military living on the base: 41.0 percent

## STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAS Lemoore (1999)

## Export income multiplier:

Change in local Sales volume ..... Direct: \$5,123,000  
 Induced: \$8,085,000  
 Total: \$13,208,000 ( 0.098%)  
 Employment ..... Direct: 40  
 Total: 389 ( 0.112%)  
 Income ..... Direct: \$733,000  
 Total (place of work): \$11,809,000  
 Total (place of residence): \$11,700,000 ( 0.096%)  
 Local population ..... 416 ( 0.059%)  
 Local off-base population ..... 245  
 Number of school children ..... 70  
 Demand for housing ..... Rental: 63  
 Owner occupied: 35  
 Government expenditures ..... \$871,000  
 Government revenues ..... \$1,373,000  
 Net Government revenues ..... \$501,000  
 Civilian employees expected to relocate: 0  
 Military employees expected to relocate: 167

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 E/F at NAS Lemoore (2000)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2  
 Change in expenditures for local services and supplies: \$107,500  
 Change in civilian employment: 120  
 Average income of affected civilian personnel: \$30,861  
 Percent expected to relocate: 0.0 percent  
 Change in military employment: 594  
 Average income of affected military personnel: \$37,230  
 Percent of military living on the base: 41.0 percent

## STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAS Lemoore (2000)

## Export income multiplier:

Change in local Sales volume ..... Direct: \$10,372,000  
 Induced: \$17,318,000  
 Total: \$28,290,000 ( 0.209%)  
 Employment ..... Direct: 85  
 Total: 933 ( 0.269%)  
 Income ..... Direct: \$1,569,000  
 Total (place of work): \$29,863,000  
 Total (place of residence): \$29,617,000 ( 0.243%)  
 Local population ..... 1,479 ( 0.210%)  
 Local off-base population ..... 873  
 Number of school children ..... 250  
 Demand for housing ..... Rental: 224  
 Owner occupied: 126  
 Government expenditures ..... \$2,258,000  
 Government revenues ..... \$3,888,000  
 Net Government revenues ..... \$1,631,000  
 Civilian employees expected to relocate: 0  
 Military employees expected to relocate: 594

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 E/F at NAS Lemoore (2001)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$107,500  
 Change in civilian employment: 120  
 Average income of affected civilian personnel: \$30,861  
 Percent expected to relocate: 0.0 percent  
 Change in military employment: 780  
 Average income of affected military personnel: \$37,230  
 Percent of military living on the base: 41.0 percent

STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAS Lemoore (2001)

## Export income multiplier:

Change in local Sales volume ..... Direct: \$13,520,000 2.5783  
 Induced: \$21,339,000  
 Total: \$34,860,000 ( 0.258%)  
 Employment ..... Direct: 105  
 Total: 1,170 ( 0.338%)  
 Income ..... Direct: \$1,933,000  
 Total (place of work): \$37,727,000  
 Total (place of residence): \$37,422,000 ( 0.307%)  
 Local population ..... 1,942 ( 0.275%)  
 Local off-base population ..... 1,146  
 Number of school children ..... 329  
 Demand for housing ..... Rental: 295  
 Owner occupied: 166  
 Government expenditures ..... \$2,861,000  
 Government revenues ..... \$4,984,000  
 Net Government revenues ..... \$2,123,000  
 Civilian employees expected to relocate: 0  
 Military employees expected to relocate: 780

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 E/F at NAS Lemoore (2002)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$107,500  
 Change in civilian employment: 120  
 Average income of affected civilian personnel: \$30,861  
 Percent expected to relocate: 0.0 percent  
 Change in military employment: 1,058  
 Average income of affected military personnel: \$37,230  
 Percent of military living on the base: 41.0 percent

STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAS Lemoore (2002)

## Export income multiplier:

Change in local Sales volume ..... Direct: \$14,647,000 2.5783  
 Induced: \$23,117,000  
 Total: \$37,763,000 ( 0.279%)  
 Employment ..... Direct: 114  
 Total: 1,353 ( 0.390%)  
 Income ..... Direct: \$2,094,000  
 Total (place of work): \$44,851,000  
 Total (place of residence): \$44,511,000 ( 0.365%)  
 Local population ..... 2,634 ( 0.374%)  
 Local off-base population ..... 1,554  
 Number of school children ..... 446  
 Demand for housing ..... Rental: 400  
 Owner occupied: 225  
 Government expenditures ..... \$3,444,000  
 Government revenues ..... \$6,243,000  
 Net Government revenues ..... \$2,798,000  
 Civilian employees expected to relocate: 0  
 Military employees expected to relocate: 1,058

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 E/F at NAS Lemoore (2003)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$107,500

Change in civilian employment: 120

Average income of affected civilian personnel: \$30,861

Percent expected to relocate: 0.0 percent

Change in military employment: 1,336

Average income of affected military personnel: \$37,230

Percent of military living on the base: 41.0 percent

## STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAS Lemoore (2003)

## Export income multiplier:

## Change in local

Export income multiplier:	2.5783
Change in local	
Sales volume	\$21,137,000
	\$33,361,000
	\$54,498,000 ( 0.403%)
Employment	164
	1,879 ( 0.542%)
Income	\$3,022,000
	\$61,235,000
	\$60,752,000 ( 0.499%)
	3,327 ( 0.472%)
Local population	1,963
Local off-base population	564
Number of school children	504
Demand for housing	284
Owner occupied:	
Government expenditures	\$4,666,000
Government revenues	\$8,260,000
Net Government revenues	\$3,593,000
Civilian employees expected to relocate:	0
Military employees expected to relocate:	1,336

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 E/F at NAS Lemoore (2004)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$107,500

Change in civilian employment: 120

Average income of affected civilian personnel: \$30,861

Percent expected to relocate: 0.0 percent

Change in military employment: 1,856

Average income of affected military personnel: \$37,230

Percent of military living on the base: 41.0 percent

## STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAS Lemoore (2004)

## Export income multiplier:

## Change in local

Export income multiplier:	2.5783
Change in local	
Sales volume	\$28,261,000
	\$44,604,000
	\$72,864,000 ( 0.538%)
Employment	219
	2,541 ( 0.733%)
Income	\$4,041,000
	\$83,221,000
	\$82,571,000 ( 0.678%)
	4,621 ( 0.655%)
Local population	2,727
Local off-base population	783
Number of school children	701
Demand for housing	394
Owner occupied:	
Government expenditures	\$6,355,000
Government revenues	\$11,323,000
Net Government revenues	\$4,968,000
Civilian employees expected to relocate:	0
Military employees expected to relocate:	1,856

# CONSTRUCTION

Project name: NAS Lemoore 1999

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$20,540,000

Local expenditures of project: 12,573,486.14 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAS Lemoore 1999

Export income multiplier:

2.5783

### Change in local

Sales volume .....	Direct:	\$10,725,000	
	Induced:	\$16,927,000	
	Total:	\$27,652,000	( 0.200%)
Employment .....	Direct:	81	
	Total:	346	( 0.100%)
Income .....	Direct:	\$1,501,000	
	Total (place of work):	\$8,465,000	
	Total (place of residence):	\$8,419,000	( 0.069%)
Local population .....		92	( 0.013%)
Local off-base population .....		92	
Number of school children .....		16	
Demand for housing .....	Rental:	41	
	Owner occupied:	0	
Government expenditures .....		\$815,000	
Government revenues .....		\$849,000	
Net Government revenues .....		\$34,000	
Civilian employees expected to relocate:		41	
Military employees expected to relocate:		0	

# CONSTRUCTION

Project name: NAS Lemoore 2000

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$37,810,000

Local expenditures of project: 23,145,253.70 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAS Lemoore 2000

Export income multiplier: 2.5783

### Change in local

Sales volume .....	Direct:	\$19,742,000	
	Induced:	\$31,159,000	
	Total:	\$50,901,000	( 0.368%)
Employment .....	Direct:	150	
	Total:	636	( 0.184%)
Income .....	Direct:	\$2,763,000	
	Total (place of work):	\$15,583,000	
	Total (place of residence):	\$15,498,000	( 0.127%)
Local population .....		170	( 0.024%)
Local off-base population .....		170	
Number of school children .....		30	
Demand for housing .....	Rental:	75	
	Owner occupied:	0	
Government expenditures .....		\$1,501,000	
Government revenues .....		\$1,563,000	
Net Government revenues .....		\$62,000	
Civilian employees expected to relocate:		75	
Military employees expected to relocate:		0	

# CONSTRUCTION

Project name: NAS Lemoore 2001

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$51,000,000

Local expenditures of project: 31,219,464.13 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAS Lemoore 2001

Export income multiplier: 2.5783

### Change in local

Sales volume	Direct:	\$26,629,000	
	Induced:	\$42,029,000	
	Total:	\$68,658,000	( 0.497%)
Employment	Direct:	202	
	Total:	858	( 0.248%)
Income	Direct:	\$3,727,000	
	Total (place of work):	\$21,019,000	
	Total (place of residence):	\$20,905,000	( 0.172%)
Local population		229	( 0.032%)
Local off-base population		229	
Number of school children		41	
Demand for housing	Rental:	101	
	Owner occupied:	0	
Government expenditures		\$2,025,000	
Government revenues		\$2,109,000	
Net Government revenues		\$84,000	
Civilian employees expected to relocate:		101	
Military employees expected to relocate:		0	

# CONSTRUCTION

Project name: NAS Lemoore 2002

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$28,150,000

Local expenditures of project: 17,231,919.90 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAS Lemoore 2002

Export income multiplier: 2.5783

### Change in local

Sales volume .....	Direct:	\$14,698,000	
	Induced:	\$23,198,000	
	Total:	\$37,896,000	( 0.274%)
Employment .....	Direct:	112	
	Total:	474	( 0.137%)
Income .....	Direct:	\$2,057,000	
	Total (place of work):	\$11,601,000	
	Total (place of residence):	\$11,539,000	( 0.095%)
Local population .....		126	( 0.018%)
Local off-base population .....		126	
Number of school children .....		22	
Demand for housing .....	Rental:	56	
	Owner occupied:	0	
Government expenditures .....		\$1,117,000	
Government revenues .....		\$1,164,000	
Net Government revenues .....		\$47,000	
Civilian employees expected to relocate:		56	
Military employees expected to relocate:		0	

# CONSTRUCTION

Project name: NAS Lemoore 2003

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$24,802,000

Local expenditures of project: 15,182,453.91 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAS Lemoore 2003

Export income multiplier:

2.5783

### Change in local

Sales volume .....	Direct:	\$12,950,000	
	Induced:	\$20,439,000	
	Total:	\$33,389,000	( 0.241%)
Employment .....	Direct:	98	
	Total:	417	( 0.120%)
Income .....	Direct:	\$1,813,000	
	Total (place of work):	\$10,222,000	
	Total (place of residence):	\$10,166,000	( 0.083%)
Local population .....		111	( 0.016%)
Local off-base population .....		111	
Number of school children .....		20	
Demand for housing .....	Rental:	49	
	Owner occupied:	0	
Government expenditures.....		\$985,000	
Government revenues .....		\$1,026,000	
Net Government revenues .....		\$41,000	
Civilian employees expected to relocate:		49	
Military employees expected to relocate:		0	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAS Lemoore (1998)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$700,150

Change in civilian employment: 10

Average income of affected civilian personnel: \$30,861

Percent expected to relocate: 100%

Change in military employment: 237

Average income of affected military personnel: \$37,230

Percent of military living on the base: 33.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAS LEMOORE (1998)

Export income multiplier:

2.5783

Change in local

Sales volume .....	Direct:	\$3,374,000	
	Induced:	\$5,326,000	
	Total:	\$8,700,000	( 0.064%)
Employment .....	Direct:	26	
	Total:	314	( 0.091%)
Income .....	Direct:	\$482,000	
	Total (place of work):	\$7,979,000	
	Total (place of residence):	\$7,910,000	( 0.065%)
Local population .....		619	( 0.088%)
Local off-base population .....		424	
Number of school children .....		104	
Demand for housing .....	Rental:	106	
	Owner occupied:	63	
Government expenditures.....		\$934,000	
Government revenues .....		\$1,353,000	
Net Government revenues .....		\$418,000	
Civilian employees expected to relocate:		10	
Military employees expected to relocate:		237	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAS Lemoore (1999)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$967,689

Change in civilian employment: 160

Average income of affected civilian personnel: \$30,861

Percent expected to relocate: 25%

Change in military employment: 1,115

Average income of affected military personnel: \$37,230

Percent of military living on the base: 34.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAS LEMOORE (1999)

Export income multiplier:	2.5783
Change in local	
Sales volume .....	
Direct:	\$20,443,000
Induced:	\$32,265,000
Total:	\$52,708,000 ( 0.389%)
Employment .....	
Direct:	159
Total:	1,684 ( 0.486%)
Income .....	
Direct:	\$2,923,000
Total (place of work):	\$53,986,000
Total (place of residence):	\$53,514,000 ( 0.439%)
Local population .....	2,892 ( 0.410%)
Local off-base population .....	1,948
Number of school children .....	486
Demand for housing .....	489
Rental:	287
Owner occupied:	
Government expenditures.....	\$4,687,000
Government revenues .....	\$7,635,000
Net Government revenues .....	\$2,948,000
Civilian employees expected to relocate:	40
Military employees expected to relocate:	1,115

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAS Lemoore (2000)

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (business volume)	(PPI - 1987)	= 100.0
local services and supplies	(PPI - 1993)	= 115.7
output and incomes (business volume)	(PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$964,689

Change in civilian employment: 160

Average income of affected civilian personnel: \$30,861

Percent expected to relocate: 25.0%

Change in military employment: 1,542

Average income of affected military personnel: \$37,230

Percent of military living on the base: 36.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAS LEMOORE (2000)

Export income multiplier:

2.5783

Change in local

Sales volume	Direct:	\$26,286,000	
	Induced:	\$41,486,000	
	Total:	\$67,772,000	( 0.501%)
Employment	Direct:	204	
	Total:	2,228	( 0.643%)
Income	Direct:	\$3,759,000	
	Total (place of work):	\$72,037,000	
	Total (place of residence):	\$71,429,000	( 0.587%)
Local population		3,955	( 0.561%)
Local off-base population		2,573	
Number of school children		667	
Demand for housing	Rental:	650	
	Owner occupied:	377	
Government expenditures		\$6,069,000	
Government revenues		\$10,147,000	
Net Government revenues		\$4,078,000	
Civilian employees expected to relocate:		40	
Military employees expected to relocate:		1,542	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAS Lemoore (2001)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$964,689

Change in civilian employment: 160

Average income of affected civilian personnel: \$30,861

Percent expected to relocate: 25.0%

Change in military employment: 1,728

Average income of affected military personnel: \$37,230

Percent of military living on the base: 41.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAS LEMOORE (2001)

Export income multiplier:

2.5783

Change in local

Sales volume .....	Direct:	\$28,274,000	
	Induced:	\$44,624,000	
	Total:	\$72,897,000	( 0.539%)
Employment .....	Direct:	219	
	Total:	2,453	( 0.708%)
Income .....	Direct:	\$4,043,000	
	Total (place of work):	\$79,695,000	
	Total (place of residence):	\$79,064,000	( 0.649%)
Local population .....		4,418	( 0.627%)
Local off-base population .....		2,654	
Number of school children .....		745	
Demand for housing .....	Rental:	671	
	Owner occupied:	389	
Government expenditures .....		\$6,294,000	
Government revenues .....		\$10,913,000	
Net Government revenues .....		\$4,619,000	
Civilian employees expected to relocate:		40	
Military employees expected to relocate:		1,728	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAS Lemoore (2002)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$964,689

Change in civilian employment: 160

Average income of affected civilian personnel: \$30,861

Percent expected to relocate: 25.0%

Change in military employment: 2,006

Average income of affected military personnel: \$37,230

Percent of military living on the base: 41.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAS LEMOORE (2002)

Export income multiplier:

2.5783

Change in local

Sales volume .....	Direct:	\$32,082,000	
	Induced:	\$50,635,000	
	Total:	\$82,716,000	( 0.611%)
Employment .....	Direct:	249	
	Total:	2,808	( 0.810%)
Income .....	Direct:	\$4,587,000	
	Total (place of work):	\$91,449,000	
	Total (place of residence):	\$90,729,000	( 0.745%)
Local population .....		5,110	( 0.725%)
Local off-base population .....		3,062	
Number of school children .....		863	
Demand for housing .....	Rental:	776	
	Owner occupied:	448	
Government expenditures.....		\$7,197,000	
Government revenues .....		\$12,551,000	
Net Government revenues .....		\$5,354,000	
Civilian employees expected to relocate:		40	
Military employees expected to relocate:		2,006	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAS Lemoore (2003)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$964,689

Change in civilian employment: 160

Average income of affected civilian personnel: \$30,861

Percent expected to relocate: 25.0%

Change in military employment: 2,284

Average income of affected military personnel: \$37,230

Percent of military living on the base: 38.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAS LEMOORE (2003)

Export income multiplier:

2.5783

Change in local

Sales volume .....	Direct:	\$36,388,000	
	Induced:	\$57,431,000	
	Total:	\$93,819,000	( 0.693%)
Employment .....	Direct:	282	
	Total:	3,172	( 0.915%)
Income .....	Direct:	\$5,203,000	
	Total (place of work):	\$103,386,000	
	Total (place of residence):	\$102,545,000	( 0.842%)
Local population .....		5,803	( 0.823%)
Local off-base population .....		3,641	
Number of school children .....		980	
Demand for housing .....	Rental:	925	
	Owner occupied:	531	
Government expenditures.....		\$8,436,000	
Government revenues .....		\$14,481,000	
Net Government revenues .....		\$6,046,000	
Civilian employees expected to relocate:		40	
Military employees expected to relocate:		2,284	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAS Lemoore (2004)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$964,689

Change in civilian employment: 160

Average income of affected civilian personnel: \$30,861

Percent expected to relocate: 25.0%

Change in military employment: 2,804

Average income of affected military personnel: \$37,230

Percent of military living on the base: 38.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAS LEMOORE (2004)

Export income multiplier:

2.5783

Change in local

Sales volume .....	Direct:	\$43,625,000	
	Induced:	\$68,853,000	
	Total:	\$112,478,000	( 0.831%)
Employment .....	Direct:	338	
	Total:	3,836	( 1.107%)
Income .....	Direct:	\$6,238,000	
	Total (place of work):	\$125,414,000	
	Total (place of residence):	\$124,399,000	( 1.021%)
Local population .....		7,097	( 1.007%)
Local off-base population .....		4,444	
Number of school children .....		1,200	
Demand for housing .....	Rental:	1,131	
	Owner occupied:	647	
Government expenditures .....		\$10,201,000	
Government revenues .....		\$17,611,000	
Net Government revenues .....		\$7,411,000	
Civilian employees expected to relocate:		40	
Military employees expected to relocate:		2,804	

# CONSTRUCTION CUMULATIVE IMPACTS

Project name: NAS Lemoore (1998)

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$22,625,000

Local expenditures of project: \$13,849,811.29 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAS LEMOORE CUMULATIVE IMPACTS (1998)

Export income multiplier:

2.5783

Change in local

Sales volume .....	Direct:	\$11,813,000	
	Induced:	\$18,645,000	
	Total:	\$30,459,000	( 0.220%)
Employment .....	Direct:	90	
	Total:	381	( 0.110%)
Income .....	Direct:	\$1,653,000	
	Total (place of work):	\$9,324,000	
	Total (place of residence):	\$9,274,000	( 0.076%)
Local population .....		102	( 0.014%)
Local off-base population .....		102	
Number of school children .....		18	
Demand for housing .....	Rental:	45	
	Owner occupied:	0	
Government expenditures.....		\$898,000	
Government revenues .....		\$936,000	
Net Government revenues .....		\$37,000	
Civilian employees expected to relocate:		45	
Military employees expected to relocate:		0	

# CONSTRUCTION CUMULATIVE IMPACTS

Project name: NAS Lemoore (1999)

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$51,923,000

Local expenditures of project: \$31,784,475.21 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAS LEMOORE CUMULATIVE IMPACTS (1999)

Export income multiplier: 2.5783

### Change in local

Sales volume .....	Direct:	\$27,111,000	
	Induced:	\$42,789,000	
	Total:	\$69,900,000	( 0.506%)
Employment .....	Direct:	206	
	Total:	874	( 0.252%)
Income .....	Direct:	\$3,795,000	
	Total (place of work):	\$21,399,000	
	Total (place of residence):	\$21,283,000	( 0.175%)
Local population .....		233	( 0.033%)
Local off-base population .....		233	
Number of school children .....		41	
Demand for housing .....	Rental:	103	
	Owner occupied:	0	
Government expenditures .....		\$2,061,000	
Government revenues .....		\$2,147,000	
Net Government revenues .....		\$86,000	
Civilian employees expected to relocate:		103	
Military employees expected to relocate:		0	

# CONSTRUCTION CUMULATIVE IMPACTS

Project name: NAS Lemoore (2000)

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$42,189,000

Local expenditures of project: \$25,825,842.59 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAS LEMOORE CUMULATIVE IMPACTS (2000)

Export income multiplier:

2.5783

Change in local

Sales volume	Direct:	\$22,029,000	
	Induced:	\$34,768,000	
	Total:	\$56,796,000	( 0.411%)
Employment	Direct:	167	
	Total:	710	( 0.205%)
Income	Direct:	\$3,083,000	
	Total (place of work):	\$17,387,000	
	Total (place of residence):	\$17,293,000	( 0.142%)
Local population		189	( 0.027%)
Local off-base population		189	
Number of school children		34	
Demand for housing	Rental:	84	
	Owner occupied:	0	
Government expenditures		\$1,675,000	
Government revenues		\$1,744,000	
Net Government revenues		\$70,000	
Civilian employees expected to relocate:		84	
Military employees expected to relocate:		0	

# CONSTRUCTION CUMULATIVE IMPACTS

Project name: NAS Lemoore (2001)

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$51,000,000

Local expenditures of project: \$31,219,464.13 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAS LEMOORE CUMULATIVE IMPACTS (2001)

Export income multiplier:

2.5783

Change in local

Sales volume	Direct:	\$26,629,000	
	Induced:	\$42,029,000	
	Total:	\$68,658,000	( 0.497%)
Employment	Direct:	202	
	Total:	858	( 0.248%)
Income	Direct:	\$3,727,000	
	Total (place of work):	\$21,019,000	
	Total (place of residence):	\$20,905,000	( 0.172%)
Local population		229	( 0.032%)
Local off-base population		229	
Number of school children		41	
Demand for housing	Rental:	101	
	Owner occupied:	0	
Government expenditures		\$2,025,000	
Government revenues		\$2,109,000	
Net Government revenues		\$84,000	
Civilian employees expected to relocate:		101	
Military employees expected to relocate:		0	

# CONSTRUCTION CUMULATIVE IMPACTS

Project name: NAS Lemoore (2002)

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$28,150,000

Local expenditures of project: \$17,231,919.90 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAS LEMOORE CUMULATIVE IMPACTS (2002)

Export income multiplier:

2.5783

### Change in local

Sales volume .....	Direct:	\$14,698,000	
	Induced:	\$23,198,000	
	Total:	\$37,896,000	( 0.274%)
Employment .....	Direct:	112	
	Total:	474	( 0.137%)
Income .....	Direct:	\$2,057,000	
	Total (place of work):	\$11,601,000	
	Total (place of residence):	\$11,539,000	( 0.095%)
Local population .....		126	( 0.018%)
Local off-base population .....		126	
Number of school children .....		22	
Demand for housing .....	Rental:	56	
	Owner occupied:	0	
Government expenditures .....		\$1,717,000	
Government revenues .....		\$1,164,000	
Net Government revenues .....		\$47,000	
Civilian employees expected to relocate:		56	
Military employees expected to relocate:		0	

# CONSTRUCTION CUMULATIVE IMPACTS

Project name: NAS Lemoore (2003)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (construction) (ENR-const - 1987)	= 100.0
local expenditures for construction (ENR-const - 1993)	= 118.2
output and incomes (construction) (ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$24,802,000

Local expenditures of project: \$15,182,453.91 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

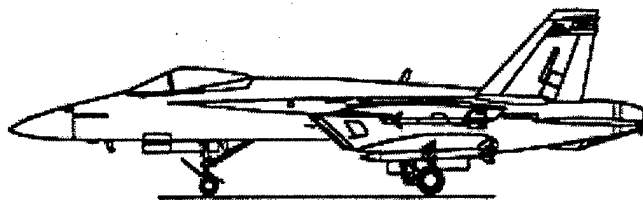
Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAS LEMOORE CUMULATIVE IMPACTS (2003)

Export income multiplier: 2.5783

### Change in local

Sales volume	Direct:	\$12,950,000	
	Induced:	\$20,439,000	
	Total:	\$33,389,000	( 0.241%)
Employment	Direct:	98	
	Total:	417	( 0.120%)
Income	Direct:	\$1,813,000	
	Total (place of work):	\$10,222,000	
	Total (place of residence):	\$10,166,000	( 0.083%)
Local population		111	( 0.016%)
Local off-base population		111	
Number of school children		20	
Demand for housing	Rental:	49	
	Owner occupied:	0	
Government expenditures		\$985,000	
Government revenues		\$1,026,000	
Net Government revenues		\$41,000	
Civilian employees expected to relocate:		49	
Military employees expected to relocate:		0	



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## EIFS Model Results for NAF El Centro

**RATIONAL THRESHOLD VALUES**  
**NAF El Centro**  
**Imperial County**

All dollar amounts are in thousands of dollars.  
Dollar adjustment based on Consumer Price Index (1987=100).

**POPULATION**

YEAR	Population	change	deviation	%deviation
1969	73,600			
1970	74,800	1,200	-1,209	-1.642 %
1971	74,900	100	-2,309	-3.086 %
1972	75,900	1,000	-1,409	-1.881 %
1973	79,600	3,700	1,291	1.701 %
1974	81,500	1,900	-509	-0.639 %
1975	83,000	1,500	-909	-1.115 %
1976	85,300	2,300	-109	-0.131 %
1977	87,000	1,700	-709	-0.831 %
1978	88,500	1,500	-909	-1.044 %
1979	90,100	1,600	-809	-0.914 %
1980	92,900	2,800	391	0.434 %
1981	94,800	1,900	-509	-0.548 %
1982	96,600	1,800	-609	-0.642 %
1983	98,300	1,700	-709	-0.734 %
1984	99,300	1,000	-1,409	-1.433 %
1985	101,500	2,200	-209	-0.210 %
1986	101,700	200	-2,209	-2.176 %
1987	103,400	1,700	-709	-0.697 %
1988	105,700	2,300	-109	-0.105 %
1989	107,800	2,100	-309	-0.292 %
1990	111,100	3,300	891	0.827 %
1991	118,500	7,400	4,991	4.493 %
1992	129,000	10,500	8,091	6.828 %

average yearly change:	2,409
maximum historic positive deviation:	8,091
maximum historic negative deviation:	-2,309
maximum historic % positive deviation:	6.828 %
maximum historic % negative deviation:	-3.086 %
positive rtv:	6.828 %
negative rtv:	-1.543 %

Source: Bureau of Economic Analysis

**RATIONAL THRESHOLD VALUES**  
**MAF El Centro**  
**Imperial County**

All dollar amounts are in thousands of dollars.  
 Dollar adjustment based on Consumer Price Index (1987=100).

**EMPLOYMENT**

YEAR	Employment	change	deviation	%deviation
1969	33,653			
1970	33,858	205	-646	-1.919 %
1971	33,916	58	-793	-2.342 %
1972	34,936	1,020	169	0.498 %
1973	36,607	1,671	820	2.347 %
1974	39,457	2,850	1,999	5.461 %
1975	42,220	2,763	1,912	4.846 %
1976	44,472	2,252	1,401	3.318 %
1977	44,214	-258	-1,109	-2.494 %
1978	44,479	265	-586	-1.325 %
1979	46,474	1,995	1,144	2.572 %
1980	45,249	-1,225	-2,076	-4.467 %
1981	43,737	-1,512	-2,363	-5.222 %
1982	43,474	-263	-1,114	-2.547 %
1983	43,121	-353	-1,204	-2.769 %
1984	42,637	-484	-1,335	-3.096 %
1985	41,388	-1,249	-2,100	-4.925 %
1986	42,777	1,389	538	1.300 %
1987	43,760	983	132	0.309 %
1988	47,737	3,977	3,126	7.144 %
1989	52,473	4,736	3,885	8.138 %
1990	52,896	423	-428	-0.816 %
1991	51,334	-1,562	-2,413	-4.562 %
1992	53,225	1,891	1,040	2.026 %

average yearly change:	851
maximum historic positive deviation:	3,885
maximum historic negative deviation:	-2,413
maximum historic % positive deviation:	8.138 %
maximum historic % negative deviation:	-5.222 %
positive rtv:	8.138 %
negative rtv:	-3.499 %

**RATIONAL THRESHOLD VALUES**  
**MAF El Centro**  
**Imperial County**

All dollar amounts are in thousands of dollars.  
 Dollar adjustment based on Consumer Price Index (1987=100).

**BUSINESS VOLUME (using Non-Farm Income)**

YEAR	Non-Farm income	adjusted income	change	deviation	%deviation
1969	152,212	450,331			
1970	161,730	451,760	1,428	-17,842	-3.962 %
1971	171,617	460,099	8,339	-10,931	-2.420 %
1972	186,227	482,453	22,354	3,083	0.670 %
1973	213,909	521,729	39,276	20,005	4.147 %
1974	247,862	544,752	23,022	3,752	0.719 %
1975	280,774	564,938	20,186	915	0.168 %
1976	318,020	605,752	40,815	21,544	3.814 %
1977	345,578	618,207	12,455	-6,816	-1.125 %
1978	382,167	634,829	16,621	-2,649	-0.429 %
1979	429,228	640,639	5,810	-13,461	-2.120 %
1980	461,457	606,382	-34,256	-53,527	-8.355 %
1981	492,046	586,467	-19,915	-39,186	-6.462 %
1982	502,661	565,423	-21,044	-40,315	-6.874 %
1983	506,253	552,678	-12,745	-32,016	-5.662 %
1984	552,581	582,891	30,213	10,943	1.980 %
1985	588,297	599,691	16,800	-2,471	-0.424 %
1986	645,186	668,587	68,895	49,625	8.275 %
1987	700,289	700,289	31,702	12,432	1.859 %
1988	792,804	762,312	62,023	42,752	6.105 %
1989	866,829	795,256	32,944	13,674	1.794 %
1990	957,500	834,786	39,530	20,260	2.548 %
1991	995,033	833,361	-1,425	-20,696	-2.479 %
1992	1,097,293	893,561	60,200	40,929	4.911 %

average yearly change:	19,271
maximum historic positive deviation:	49,625
maximum historic negative deviation:	-53,527
maximum historic % positive deviation:	8.275 %
maximum historic % negative deviation:	-8.355 %
positive rtv:	8.275 %
negative rtv:	-6.266 %

**RATIONAL THRESHOLD VALUES**  
**NAF El Centro**  
**Imperial County**

All dollar amounts are in thousands of dollars.  
 Dollar adjustment based on Consumer Price Index (1987=100).

**PERSONAL INCOME**

YEAR	Personal income	adjusted income	change	deviation	%deviation
1969	268,690	794,941			
1970	281,882	787,380	-7,561	-36,138	-4.546 %
1971	281,045	753,472	-33,908	-62,485	-7.936 %
1972	363,601	941,972	188,500	159,923	21.225 %
1973	401,349	978,900	36,928	8,352	0.887 %
1974	462,279	1,015,998	37,098	8,321	0.870 %
1975	490,557	987,036	-28,962	-57,538	-5.663 %
1976	549,020	1,045,752	58,716	30,139	3.054 %
1977	569,560	1,018,891	-26,862	-55,438	-5.301 %
1978	625,286	1,038,681	19,790	-8,787	-0.862 %
1979	900,513	1,344,049	305,368	276,791	26.648 %
1980	854,260	1,122,549	-221,500	-250,077	-18.606 %
1981	893,129	1,064,516	-58,033	-86,610	-7.715 %
1982	987,808	1,111,145	46,629	18,052	1.696 %
1983	1,028,069	1,122,346	11,201	-17,376	-1.564 %
1984	1,066,454	1,124,951	2,605	-25,971	-2.314 %
1985	1,062,805	1,083,389	-41,562	-70,139	-6.235 %
1986	1,092,758	1,132,392	49,002	20,426	1.885 %
1987	1,259,735	1,259,735	127,343	98,767	8.722 %
1988	1,439,442	1,384,079	124,344	95,767	7.602 %
1989	1,599,199	1,467,155	83,076	54,499	3.938 %
1990	1,693,858	1,476,772	9,617	-18,959	-1.292 %
1991	1,684,094	1,410,464	-66,309	-94,885	-6.425 %
1992	1,783,310	1,452,207	41,743	13,166	0.933 %

average yearly change:	28,577
maximum historic positive deviation:	276,791
maximum historic negative deviation:	-250,077
maximum historic % positive deviation:	26.648 %
maximum historic % negative deviation:	-18.606 %
positive rtv:	26.648 %
negative rtv:	-12.466 %

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 at El Centro (1999)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$107,500  
 Change in civilian employment: 200  
 Average income of affected civilian personnel: \$30,861  
 Percent expected to relocate: 0.0 percent  
 Change in military employment: 153  
 Average income of affected military personnel: \$37,230  
 Percent of military living on the base: 41.0 percent

## STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAF El Centro (1999)

## Export income multiplier:

Change in local Sales volume ..... 1.6798

Direct: \$6,749,000  
 Induced: \$4,588,000  
 Total: \$11,338,000 ( 0.741%)  
 Employment ..... 50  
 Direct: 438 ( 1.000%)  
 Total: 438

Income ..... \$838,000

Total (place of work): \$13,276,000

Total (place of residence): \$13,276,000 ( 0.834%)

Local population ..... 381 ( 0.368%)

Local off-base population ..... 225

Number of school children ..... 65

Demand for housing ..... 58

Owner occupied: 32

Government expenditures..... \$1,102,000

Government revenues ..... \$2,995,000

Net Government revenues ..... \$1,893,000

Civilian employees expected to relocate: 0

Military employees expected to relocate: 153

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 at El Centro (2000)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$107,500  
 Change in civilian employment: 200  
 Average income of affected civilian personnel: \$30,861  
 Percent expected to relocate: 0.0  
 Change in military employment: 802  
 Average income of affected military personnel: \$37,230  
 Percent of military living on the base: 41.0 percent

## STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAF El Centro (2000)

## Export income multiplier:

Change in local Sales volume ..... 1.6798

Direct: \$15,640,000  
 Induced: \$10,632,000  
 Total: \$26,272,000 ( 1.717%)  
 Employment ..... 117  
 Direct: 1,198 ( 2.738%)  
 Total: 1,198

Income ..... \$1,942,000

Total (place of work): \$39,293,000

Total (place of residence): \$39,293,000 ( 2.470%)

Local population ..... 1,997 ( 1.931%)

Local off-base population ..... 1,178

Number of school children ..... 345

Demand for housing ..... 303

Owner occupied: 170

Government expenditures..... \$3,407,000

Government revenues ..... \$9,777,000

Net Government revenues ..... \$6,369,000

Civilian employees expected to relocate: 0

Military employees expected to relocate: 802

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 E/F at NAF El Centro (2001)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$107,500

Change in civilian employment: 200

Average income of affected civilian personnel: \$30,861

Percent expected to relocate: 0.0 percent

Change in military employment: 970

Average income of affected military personnel: \$37,230

Percent of military living on the base: 41.0 percent

## STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAF El Centro (2001)

## Export income multiplier:

Change in local

Sales volume ..... Direct: \$17,942,000  
 Induced: \$12,197,000  
 Total: \$30,138,000 ( 1.969%)

Employment ..... Direct: 134  
 Total: 1,395 ( 3.188%)

Income ..... Direct: \$2,228,000  
 Total (place of work): \$46,028,000 ( 2.893%)

Local population ..... ( 2.415 ( 2.336%)

Local off-base population ..... 1,425

Number of school children ..... 418

Demand for housing ..... Rental: 366

Owner occupied: 206

Government expenditures ..... \$4,004,000

Government revenues ..... \$11,532,000

Net Government revenues ..... \$7,528,000

Civilian employees expected to relocate: 0

Military employees expected to relocate: 970

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 E/F at NAF El Centro (2002)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$107,500

Change in civilian employment: 200

Average income of affected civilian personnel: \$30,861

Percent expected to relocate: 0.0 percent

Change in military employment: 1,244

Average income of affected military personnel: \$37,230

Percent of military living on the base: 41.0 percent

## STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAF El Centro (2002)

## Export income multiplier:

Change in local

Sales volume ..... Direct: \$21,695,000  
 Induced: \$14,748,000  
 Total: \$36,443,000 ( 2.381%)

Employment ..... Direct: 162  
 Total: 1,716 ( 3.921%)

Income ..... Direct: \$2,694,000  
 Total (place of work): \$57,012,000 ( 3.583%)

Local population ..... ( 3,098 ( 2.996%)

Local off-base population ..... 1,828

Number of school children ..... 536

Demand for housing ..... Rental: 470

Owner occupied: 264

Government expenditures ..... \$4,977,000

Government revenues ..... \$14,395,000

Net Government revenues ..... \$9,418,000

Civilian employees expected to relocate: 0

Military employees expected to relocate: 1,244

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 E/F at NAF El Centro (2003)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2  
 Change in expenditures for local services and supplies: \$107,500  
 Change in civilian employment: 200  
 Average income of affected civilian personnel: \$30,861  
 Percent expected to relocate: 0.0 percent  
 Change in military employment: 1,518  
 Average income of affected military personnel: \$37,230  
 Percent of military living on the base: 41.0 percent

STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAF El Centro (2003)

## Export income multiplier:

Change in local Sales volume ..... Direct: \$25,449,000  
 Induced: \$17,300,000  
 Total: \$42,749,000 ( 2.793%)  
 Employment ..... Direct: 190  
 Total: 2,037 ( 4.655%)  
 Income ..... Direct: \$3,160,000  
 Total (place of work): \$67,996,000  
 Total (place of residence): \$67,996,000 ( 4.274%)  
 Local population ..... 3,780 ( 3.656%)  
 Local off-base population ..... 2,230  
 Number of school children ..... 654  
 Demand for housing ..... Rental: 573  
 Owner occupied: 322  
 Government expenditures ..... \$5,950,000  
 Government revenues ..... \$17,258,000  
 Net Government revenues ..... \$11,308,000  
 Civilian employees expected to relocate: 0  
 Military employees expected to relocate: 1,518

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 E/F at NAF El Centro (2004)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2  
 Change in expenditures for local services and supplies: \$107,500  
 Change in civilian employment: 200  
 Average income of affected civilian personnel: \$30,861  
 Percent expected to relocate: 0.0 percent  
 Change in military employment: 2,525  
 Average income of affected military personnel: \$37,230  
 Percent of military living on the base: 41.0 percent

STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAF El Centro (2004)

## Export income multiplier:

Change in local Sales volume ..... Direct: \$39,244,000  
 Induced: \$26,678,000  
 Total: \$65,921,000 ( 4.307%)  
 Employment ..... Direct: 293  
 Total: 3,217 ( 7.351%)  
 Income ..... Direct: \$4,874,000  
 Total (place of work): \$108,365,000  
 Total (place of residence): \$108,365,000 ( 6.811%)  
 Local population ..... 6,287 ( 6.081%)  
 Local off-base population ..... 3,709  
 Number of school children ..... 1,088  
 Demand for housing ..... Rental: 953  
 Owner occupied: 536  
 Government expenditures ..... \$9,526,000  
 Government revenues ..... \$27,780,000  
 Net Government revenues ..... \$18,254,000  
 Civilian employees expected to relocate: 0  
 Military employees expected to relocate: 2,525

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 E/F at NAF El Centro (2005)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2  
 Change in expenditures for local services and supplies: \$107,500  
 Change in civilian employment: 200  
 Average income of affected civilian personnel: \$30,861  
 Percent expected to relocate: 0.0 percent  
 Change in military employment: 2,984  
 Average income of affected military personnel: \$37,230  
 Percent of military living on the base: 41.0 percent

## STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAF El Centro (2005)

## Export income multiplier:

Change in local Sales volume ..... Direct: \$45,532,000  
 Induced: \$30,952,000  
 Total: \$76,484,000 ( 4.998%)  
 Employment ..... Direct: 340  
 Total: 3,755 ( 8.580%)  
 Income ..... Direct: \$5,655,000  
 Total (place of work): \$126,765,000  
 Total (place of residence): \$126,765,000 ( 7.967%)  
 Local population ..... 7,430 ( 7.186%)  
 Local off-base population ..... 4,384  
 Number of school children ..... 1,286  
 Demand for housing ..... Rental: 1,127  
 Owner occupied: 634  
 Government expenditures ..... \$11,157,000  
 Government revenues ..... \$32,576,000  
 Net Government revenues ..... \$21,420,000  
 Civilian employees expected to relocate: 0  
 Military employees expected to relocate: 2,984

## STANDARD EIFS FORECAST MODEL

Project name: F/A-18 E/F at NAF El Centro (2006)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987) = 100.0  
 output and incomes (ex b.v.) (CPI - 1993) = 126.3  
 baseline year (business volume) (PPI - 1987) = 100.0  
 local services and supplies (PPI - 1993) = 115.7  
 output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1  
 local expenditures, enter 2 : 2  
 Change in expenditures for local services and supplies: \$107,500  
 Change in civilian employment: 200  
 Average income of affected civilian personnel: \$30,861  
 Percent expected to relocate: 0.0 percent  
 Change in military employment: 2,984  
 Average income of affected military personnel: \$37,230  
 Percent of military living on the base: 41.0 percent

## STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAF El Centro (2006)

## Export income multiplier:

Change in local Sales volume ..... Direct: \$45,532,000  
 Induced: \$30,952,000  
 Total: \$76,484,000 ( 4.998%)  
 Employment ..... Direct: 340  
 Total: 3,755 ( 8.580%)  
 Income ..... Direct: \$5,655,000  
 Total (place of work): \$126,765,000  
 Total (place of residence): \$126,765,000 ( 7.967%)  
 Local population ..... 7,430 ( 7.186%)  
 Local off-base population ..... 4,384  
 Number of school children ..... 1,286  
 Demand for housing ..... Rental: 1,127  
 Owner occupied: 634  
 Government expenditures ..... \$11,157,000  
 Government revenues ..... \$32,576,000  
 Net Government revenues ..... \$21,420,000  
 Civilian employees expected to relocate: 0  
 Military employees expected to relocate: 2,984

# STANDARD EIFS FORECAST MODEL

Project name: F/A-18 E/F at NAF El Centro (2007)

Default price deflators:  
baseline year (ex. business volume) (CPI - 1987) = 100.0  
output and incomes (ex b.v.) (CPI - 1993) = 126.3  
baseline year (business volume) (PPI - 1987) = 100.0  
local services and supplies (PPI - 1993) = 115.7  
output and incomes (business volume) (PPI - 1993) = 115.7

(Enter decreases as negative numbers)  
If entering total expenditures, enter 1  
local expenditures, enter 2 : 2  
Change in expenditures for local services and supplies: \$107,500  
Change in civilian employment: 200  
Average income of affected civilian personnel: \$30,861  
Percent expected to relocate: 0.0 percent  
Change in military employment: 3,443  
Average income of affected military personnel: \$37,230  
Percent of military living on the base: 41.0 percent

## STANDARD EIFS MODEL FORECAST FOR F/A-18 E/F at NAF El Centro (2007)

Export income multiplier:	1.6798
Change in local	
Sales volume	\$51,820,000
Direct:	\$35,227,000
Induced:	\$87,046,000 ( 5.688%)
Total:	387
Employment	4,293 ( 9.809%)
Total:	
Income	\$6,435,000
Direct:	\$145,165,000
Total (place of work):	\$145,165,000 ( 9.124%)
Total (place of residence):	8,573 ( 8.291%)
Local population	5,058
Local off-base population	1,484
Number of school children	1,300
Demand for housing	731
Owner occupied:	
Government expenditures	\$12,787,000
Government revenues	\$37,372,000
Net Government revenues	\$24,586,000
Civilian employees expected to relocate:	0
Military employees expected to relocate:	3,443

# CONSTRUCTION

Project name: NAF El Centro 1999

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$86,358,560

Local expenditures of project: 34,948,390.09 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAF El Centro 1999

Export income multiplier: 1.6798

### Change in local

Sales volume .....	Direct:	\$29,810,000	
	Induced:	\$20,265,000	
	Total:	\$50,074,000	( 3.203%)
Employment .....	Direct:	218	
	Total:	753	( 1.720%)
Income .....	Direct:	\$3,624,000	
	Total (place of work):	\$18,859,000	
	Total (place of residence):	\$18,859,000	( 1.185%)
Local population .....		263	( 0.254%)
Local off-base population .....		263	
Number of school children .....		48	
Demand for housing .....	Rental:	116	
	Owner occupied:	0	
Government expenditures .....		\$2,199,000	
Government revenues .....		\$4,155,000	
Net Government revenues .....		\$1,956,000	
Civilian employees expected to relocate:		116	
Military employees expected to relocate:		0	

# CONSTRUCTION

Project name: NAF El Centro 2000

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (construction) (ENR-const - 1987)	= 100.0
local expenditures for construction (ENR-const - 1993)	= 118.2
output and incomes (construction) (ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$289,134,000

Local expenditures of project: 117,009,452.45 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAF El Centro 2000

Export income multiplier: 1.6798

### Change in local

Sales volume .....	Direct:	\$99,805,000	
	Induced:	\$67,847,000	
	Total:	\$167,652,000	( 10.723%)
Employment .....	Direct:	729	
	Total:	2,520	( 5.759%)
Income .....	Direct:	\$12,133,000	
	Total (place of work):	\$63,140,000	
	Total (place of residence):	\$63,140,000	( 3.968%)
Local population .....		881	( 0.852%)
Local off-base population .....		881	
Number of school children .....		161	
Demand for housing .....	Rental:	389	
	Owner occupied:	0	
Government expenditures .....		\$7,361,000	
Government revenues .....		\$13,911,000	
Net Government revenues .....		\$6,550,000	
Civilian employees expected to relocate:		389	
Military employees expected to relocate:		0	

# CONSTRUCTION

Project name: NAF El Centro 2001

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$82,615,000

Local expenditures of project: 33,433,411.20 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAF El Centro 2001

Export income multiplier: 1.6798

### Change in local

Sales volume	Direct:	\$28,518,000	
	Induced:	\$19,386,000	
	Total:	\$47,904,000	( 3.064%)
Employment	Direct:	208	
	Total:	720	( 1.646%)
Income	Direct:	\$3,467,000	
	Total (place of work):	\$18,041,000	
	Total (place of residence):	\$18,041,000	( 1.134%)
Local population		252	( 0.243%)
Local off-base population		252	
Number of school children		46	
Demand for housing	Rental:	111	
	Owner occupied:	0	
Government expenditures		\$2,103,000	
Government revenues		\$3,975,000	
Net Government revenues		\$1,872,000	
Civilian employees expected to relocate:		111	
Military employees expected to relocate:		0	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAF El Centro (1998)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$283,343

Change in civilian employment: 26

Average income of affected civilian personnel: \$25,734

Percent expected to relocate: 38.1%

Change in military employment: 237

Average income of affected military personnel: \$27,331

Percent of military living on the base: 33.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAF EL CENTRO (1998)

Export income multiplier:

1.6798

Change in local

Sales volume .....	Direct:	\$2,977,000	
	Induced:	\$2,024,000	
	Total:	\$5,001,000	( 0.327%)
Employment .....	Direct:	22	
	Total:	300	( 0.686%)
Income .....	Direct:	\$370,000	
	Total (place of work):	\$7,768,000	
	Total (place of residence):	\$7,768,000	( 0.488%)
Local population .....		620	( 0.599%)
Local off-base population .....		425	
Number of school children .....		104	
Demand for housing .....	Rental:	106	
	Owner occupied:	63	
Government expenditures.....		\$1,057,000	
Government revenues .....		\$2,274,000	
Net Government revenues .....		\$1,217,000	
Civilian employees expected to relocate:		10	
Military employees expected to relocate:		237	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAF El Centro (1999)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$674,187

Change in civilian employment: 305

Average income of affected civilian personnel: \$29,096

Percent expected to relocate: 13.12%

Change in military employment: 1,101

Average income of affected military personnel: \$28,707

Percent of military living on the base: 34.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAF EL CENTRO (1999)

Export income multiplier:

1.6798

## Change in local

Sales volume .....	Direct:	\$19,272,000	
	Induced:	\$13,101,000	
	Total:	\$32,373,000	( 2.115%)
Employment .....	Direct:	144	
	Total:	1,648	( 3.765%)
Income .....	Direct:	\$2,393,000	
	Total (place of work):	\$44,501,000	
	Total (place of residence):	\$44,501,000	( 2.797%)
Local population .....		2,861	( 2.767%)
Local off-base population .....		1,929	
Number of school children .....		491	
Demand for housing .....	Rental:	482	
	Owner occupied:	285	
Government expenditures.....		\$5,358,000	
Government revenues .....		\$12,129,000	
Net Government revenues .....		\$6,771,000	
Civilian employees expected to relocate:		40	
Military employees expected to relocate:		1,101	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAF El Centro (2000)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$674,187

Change in civilian employment: 305

Average income of affected civilian personnel: \$29,096

Percent expected to relocate: 13.12%

Change in military employment: 1,750

Average income of affected military personnel: \$31,868

Percent of military living on the base: 37.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAF EL CENTRO (2000)

Export income multiplier: 1.6798

## Change in local

Sales volume .....	Direct:	\$28,166,000	
	Induced:	\$19,147,000	
	Total:	\$47,314,000	( 3.092%)
Employment .....	Direct:	210	
	Total:	2,408	( 5.503%)
Income .....	Direct:	\$3,498,000	
	Total (place of work):	\$70,519,000	
	Total (place of residence):	\$70,519,000	( 4.432%)
Local population .....		4,477	( 4.330%)
Local off-base population .....		2,865	
Number of school children .....		771	
Demand for housing .....	Rental:	723	
	Owner occupied:	420	
Government expenditures.....		\$7,625,000	
Government revenues .....		\$18,879,000	
Net Government revenues .....		\$11,254,000	
Civilian employees expected to relocate:		40	
Military employees expected to relocate:		1,750	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAF El Centro (2001)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$674,187

Change in civilian employment: 305

Average income of affected civilian personnel: \$29,096

Percent expected to relocate: 13.12%

Change in military employment: 1,918

Average income of affected military personnel: \$32,337

Percent of military living on the base: 37.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAF EL CENTRO (2001)

Export income multiplier:

1.6798

Change in local

Sales volume .....	Direct:	\$30,516,000	
	Induced:	\$20,745,000	
	Total:	\$51,261,000	( 3.349%)
Employment .....	Direct:	228	
	Total:	2,605	( 5.945%)
Income .....	Direct:	\$3,790,000	
	Total (place of work):	\$77,263,000	
	Total (place of residence):	\$77,263,000	( 4.856%)
Local population .....		4,895	( 4.734%)
Local off-base population .....		3,128	
Number of school children .....		843	
Demand for housing .....	Rental:	790	
	Owner occupied:	458	
Government expenditures.....		\$8,259,000	
Government revenues .....		\$20,666,000	
Net Government revenues .....		\$12,407,000	
Civilian employees expected to relocate:		40	
Military employees expected to relocate:		1,918	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAF El Centro (2002)

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (business volume)	(PPI - 1987)	= 100.0
local services and supplies	(PPI - 1993)	= 115.7
output and incomes (business volume)	(PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$674,187

Change in civilian employment: 305

Average income of affected civilian personnel: \$29,096

Percent expected to relocate: 13.12%

Change in military employment: 2,192

Average income of affected military personnel: \$32,949

Percent of military living on the base: 38.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAF EL CENTRO (2002)

Export income multiplier:	1.6798
Change in local	
Sales volume .....	Direct: \$34,209,000
	Induced: \$23,255,000
	Total: \$57,463,000 ( 3.755%)
Employment .....	Direct: 255
	Total: 2,926 ( 6.686%)
Income .....	Direct: \$4,248,000
	Total (place of work): \$88,235,000
	Total (place of residence): \$88,235,000 ( 5.546%)
Local population .....	5,578 ( 5.394%)
Local off-base population .....	3,504
Number of school children .....	961
Demand for housing .....	Rental: 887
	Owner occupied: 512
Government expenditures.....	\$9,172,000
Government revenues .....	\$23,478,000
Net Government revenues .....	\$14,307,000
Civilian employees expected to relocate:	40
Military employees expected to relocate:	2,192

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAF El Centro (2003)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$674,187

Change in civilian employment: 305

Average income of affected civilian personnel: \$29,096

Percent expected to relocate: 13.12%

Change in military employment: 2,466

Average income of affected military personnel: \$33,425

Percent of military living on the base: 38.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAF EL CENTRO (2003)

Export income multiplier:

1.6798

Change in local

Sales volume .....	Direct:	\$38,022,000	
	Induced:	\$25,847,000	
	Total:	\$63,870,000	( 4.173%)
Employment .....	Direct:	284	
	Total:	3,248	( 7.421%)
Income .....	Direct:	\$4,722,000	
	Total (place of work):	\$99,232,000	
	Total (place of residence):	\$99,232,000	( 6.237%)
Local population .....		6,260	( 6.054%)
Local off-base population .....		3,927	
Number of school children .....		1,079	
Demand for housing .....	Rental:	995	
	Owner occupied:	573	
Government expenditures .....		\$10,191,000	
Government revenues .....		\$26,380,000	
Net Government revenues .....		\$16,190,000	
Civilian employees expected to relocate:		40	
Military employees expected to relocate:		2,466	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAF El Centro (2004)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$674,187

Change in civilian employment: 305

Average income of affected civilian personnel: \$29,096

Percent expected to relocate: 13.12%

Change in military employment: 3,473

Average income of affected military personnel: \$33,425

Percent of military living on the base: 39.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAF EL CENTRO (2004)

Export income multiplier:

1.6798

## Change in local

Sales volume .....	Direct:	\$51,802,000	
	Induced:	\$35,215,000	
	Total:	\$87,017,000	( 5.686%)
Employment .....	Direct:	387	
	Total:	4,427	( 10.117%)
Income .....	Direct:	\$6,433,000	
	Total (place of work):	\$139,597,000	
	Total (place of residence):	\$139,597,000	( 8.774%)
Local population .....		8,767	( 8.479%)
Local off-base population .....		5,395	
Number of school children .....		1,514	
Demand for housing .....	Rental:	1,373	
	Owner occupied:	786	
Government expenditures.....		\$13,742,000	
Government revenues .....		\$36,881,000	
Net Government revenues .....		\$23,139,000	
Civilian employees expected to relocate:		40	
Military employees expected to relocate:		3,473	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAF El Centro (2005)

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (business volume)	(PPI - 1987)	= 100.0
local services and supplies	(PPI - 1993)	= 115.7
output and incomes (business volume)	(PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$674,187

Change in civilian employment: 305

Average income of affected civilian personnel: \$29,096

Percent expected to relocate: 13.12%

Change in military employment: 3,932

Average income of affected military personnel: \$34,843

Percent of military living on the base: 39.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAF EL CENTRO (2005)

Export income multiplier:	1.6798	
Change in local		
Sales volume .....	Direct:	\$58,156,000
	Induced:	\$39,534,000
	Total:	\$97,691,000 ( 6.383%)
Employment .....	Direct:	434
	Total:	4,966 ( 11.348%)
Income .....	Direct:	\$7,222,000
	Total (place of work):	\$158,009,000
	Total (place of residence):	\$158,009,000 ( 9.931%)
Local population .....		9,910 ( 9.584%)
Local off-base population .....		6,092
Number of school children .....		1,711
Demand for housing .....	Rental:	1,552
	Owner occupied:	887
Government expenditures.....		\$15,423,000
Government revenues .....		\$41,720,000
Net Government revenues .....		\$26,297,000
Civilian employees expected to relocate:		40
Military employees expected to relocate:		3,932

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAF El Centro (2006)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$674,187

Change in civilian employment: 305

Average income of affected civilian personnel: \$29,096

Percent expected to relocate: 13.12%

Change in military employment: 3,932

Average income of affected military personnel: \$34,843

Percent of military living on the base: 39.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAF EL CENTRO (2006)

Export income multiplier:

1.6798

## Change in local

Sales volume .....	Direct:	\$58,156,000	
	Induced:	\$39,534,000	
	Total:	\$97,691,000	( 6.383%)
Employment .....	Direct:	434	
	Total:	4,966	( 11.348%)
Income .....	Direct:	\$7,222,000	
	Total (place of work):	\$158,009,000	
	Total (place of residence):	\$158,009,000	( 9.931%)
Local population .....		9,910	( 9.584%)
Local off-base population .....		6,092	
Number of school children .....		1,711	
Demand for housing .....	Rental:	1,552	
	Owner occupied:	887	
Government expenditures .....		\$15,423,000	
Government revenues .....		\$41,720,000	
Net Government revenues .....		\$26,297,000	
Civilian employees expected to relocate:		40	
Military employees expected to relocate:		3,932	

## STANDARD EIFS FORECAST MODEL CUMULATIVE IMPACTS

Project name: NAF El Centro (2007)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (business volume) (PPI - 1987)	= 100.0
local services and supplies (PPI - 1993)	= 115.7
output and incomes (business volume) (PPI - 1993)	= 115.7

(Enter decreases as negative numbers)

If entering total expenditures, enter 1

local expenditures, enter 2 : 2

Change in expenditures for local services and supplies: \$674,187

Change in civilian employment: 305

Average income of affected civilian personnel: \$29,096

Percent expected to relocate: 13.12%

Change in military employment: 2,466

Average income of affected military personnel: \$33,425

Percent of military living on the base: 38.0%

## STANDARD EIFS MODEL FORECAST FOR CUMULATIVE IMPACTS, NAF EL CENTRO (2007)

Export income multiplier:

1.6798

## Change in local

Sales volume .....	Direct:	\$38,022,000	
	Induced:	\$25,847,000	
	Total:	\$63,870,000	( 4.173%)
Employment .....	Direct:	284	
	Total:	3,248	( 7.421%)
Income .....	Direct:	\$4,722,000	
	Total (place of work):	\$99,232,000	
	Total (place of residence):	\$99,232,000	( 6.237%)
Local population .....		6,260	( 6.054%)
Local off-base population .....		3,927	
Number of school children .....		1,079	
Demand for housing .....	Rental:	995	
	Owner occupied:	573	
Government expenditures .....		\$10,191,000	
Government revenues .....		\$26,380,000	
Net Government revenues .....		\$16,190,000	
Civilian employees expected to relocate:		40	
Military employees expected to relocate:		2,466	

# CONSTRUCTION CUMULATIVE IMPACTS

Project name: NAF El Centro (1998)

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$27,329,000

Local expenditures of project: \$11,059,755.43 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAF EL CENTRO CUMULATIVE IMPACTS (1998)

Export income multiplier: 1.6798

### Change in local

Sales volume .....	Direct:	\$9,434,000	
	Induced:	\$6,413,000	
	Total:	\$15,847,000	( 1.014%)
Employment .....	Direct:	69	
	Total:	238	( 0.544%)
Income .....	Direct:	\$1,147,000	
	Total (place of work):	\$5,968,000	
	Total (place of residence):	\$5,968,000	( 0.375%)
Local population .....		83	( 0.081%)
Local off-base population .....		83	
Number of school children .....		15	
Demand for housing .....	Rental:	37	
	Owner occupied:	0	
Government expenditures .....		\$696,000	
Government revenues .....		\$1,315,000	
Net Government revenues .....		\$619,000	
Civilian employees expected to relocate:		37	
Military employees expected to relocate:		0	

# CONSTRUCTION CUMULATIVE IMPACTS

Project name: NAF El Centro (1999)

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$57,990,000

Local expenditures of project: \$23,467,935.79 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAF EL CENTRO CUMULATIVE IMPACTS (1999)

Export income multiplier:

1.6798

### Change in local

Sales volume .....	Direct:	\$20,017,000	
	Induced:	\$13,608,000	
	Total:	\$33,625,000	( 2.151%)
Employment .....	Direct:	146	
	Total:	505	( 1.155%)
Income .....	Direct:	\$2,433,000	
	Total (place of work):	\$12,664,000	
	Total (place of residence):	\$12,664,000	( 0.796%)
Local population .....		177	( 0.171%)
Local off-base population .....		177	
Number of school children .....		32	
Demand for housing .....	Rental:	78	
	Owner occupied:	0	
Government expenditures.....		\$1,476,000	
Government revenues .....		\$2,790,000	
Net Government revenues .....		\$1,314,000	
Civilian employees expected to relocate:		78	
Military employees expected to relocate:		0	

# CONSTRUCTION CUMULATIVE IMPACTS

Project name: NAF El Centro (2000)

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$42,871,000

Local expenditures of project: \$17,349,437.41 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAF EL CENTRO CUMULATIVE IMPACTS (2000)

Export income multiplier:	1.6798
Change in local	
Sales volume .....	
Direct:	\$14,799,000
Induced:	\$10,060,000
Total:	\$24,858,000 ( 1.590%)
Employment .....	
Direct:	108
Total:	374 ( 0.854%)
Income .....	
Direct:	\$1,799,000
Total (place of work):	\$9,362,000
Total (place of residence):	\$9,362,000 ( 0.588%)
Local population .....	131 ( 0.126%)
Local off-base population .....	131
Number of school children .....	24
Demand for housing .....	
Rental:	58
Owner occupied:	0
Government expenditures.....	\$1,091,000
Government revenues .....	\$2,063,000
Net Government revenues .....	\$971,000
Civilian employees expected to relocate:	58
Military employees expected to relocate:	0

# CONSTRUCTION CUMULATIVE IMPACTS

Project name: NAF El Centro (2001)

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$51,000,000

Local expenditures of project: \$20,639,157.19 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAF EL CENTRO CUMULATIVE IMPACTS (2001)

Export income multiplier:	1.6798
Change in local	
Sales volume .....	Direct: \$17,605,000
	Induced: \$11,967,000
	Total: \$29,572,000 ( 1.891%)
Employment .....	Direct: 129
	Total: 445 ( 1.016%)
Income .....	Direct: \$2,140,000
	Total (place of work): \$11,137,000
	Total (place of residence): \$11,137,000 ( 0.700%)
Local population .....	155 ( 0.150%)
Local off-base population .....	155
Number of school children .....	28
Demand for housing .....	Rental: 69
	Owner occupied: 0
Government expenditures.....	\$1,298,000
Government revenues .....	\$2,454,000
Net Government revenues .....	\$1,155,000
Civilian employees expected to relocate:	69
Military employees expected to relocate:	0

# CONSTRUCTION CUMULATIVE IMPACTS

Project name: NAF El Centro (2002)

## Default price deflators:

baseline year (ex. business volume) (CPI - 1987)	= 100.0
output and incomes (ex b.v.) (CPI - 1993)	= 126.3
baseline year (construction) (ENR-const - 1987)	= 100.0
local expenditures for construction (ENR-const - 1993)	= 118.2
output and incomes (construction) (ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$28,150,000

Local expenditures of project: \$11,392,005.39 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

## CONSTRUCTION IMPACT FORECAST FOR NAF EL CENTRO CUMULATIVE IMPACTS (2002)

Export income multiplier:

1.6798

Change in local

Sales volume .....	Direct:	\$9,717,000	
	Induced:	\$6,606,000	
	Total:	\$16,323,000	( 1.044%)
Employment .....	Direct:	71	
	Total:	245	( 0.561%)
Income .....	Direct:	\$1,181,000	
	Total (place of work):	\$6,147,000	
	Total (place of residence):	\$6,147,000	( 0.386%)
Local population .....		86	( 0.083%)
Local off-base population .....		86	
Number of school children .....		15	
Demand for housing .....	Rental:	38	
	Owner occupied:	0	
Government expenditures.....		\$717,000	
Government revenues .....		\$1,354,000	
Net Government revenues .....		\$638,000	
Civilian employees expected to relocate:		38	
Military employees expected to relocate:		0	

# CONSTRUCTION CUMULATIVE IMPACTS

Project name: NAF El Centro (2003)

## Default price deflators:

baseline year (ex. business volume)	(CPI - 1987)	= 100.0
output and incomes (ex b.v.)	(CPI - 1993)	= 126.3
baseline year (construction)	(ENR-const - 1987)	= 100.0
local expenditures for construction	(ENR-const - 1993)	= 118.2
output and incomes (construction)	(ENR-const - 1993)	= 118.2

If entering total expenditures, enter 1

local expenditures, enter 2 : 1

Dollar volume of construction project: \$24,802,000

Local expenditures of project: \$10,037,105.42 (calculated)

Percent for labor: 34.2%

Percent for materials: 57.8%

Percent allowed for other: 8.0%

Percent of construction workers expected to migrate into the area: 30.0%

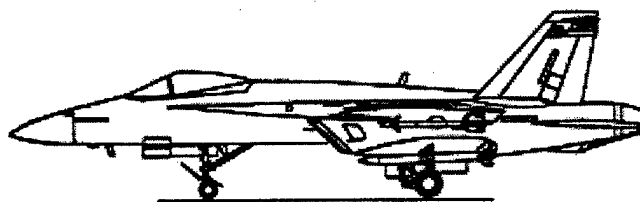
## CONSTRUCTION IMPACT FORECAST FOR NAF EL CENTRO CUMULATIVE IMPACTS (2003)

Export income multiplier:

1.6798

Change in local

Sales volume .....	Direct:	\$8,561,000	
	Induced:	\$5,820,000	
	Total:	\$14,381,000	( 0.920%)
Employment .....	Direct:	63	
	Total:	216	( 0.494%)
Income .....	Direct:	\$1,041,000	
	Total (place of work):	\$5,416,000	
	Total (place of residence):	\$5,416,000	( 0.340%)
Local population .....		76	( 0.073%)
Local off-base population .....		76	
Number of school children .....		13	
Demand for housing .....	Rental:	33	
	Owner occupied:	0	
Government expenditures.....		\$631,000	
Government revenues .....		\$1,193,000	
Net Government revenues .....		\$562,000	
Civilian employees expected to relocate:		33	
Military employees expected to relocate:		0	



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## APPENDIX C CULTURAL RESOURCES

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C.1 NAS LEMOORE

C-1

C.2 NAF EL CENTRO

C-3

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## APPENDIX C

### CULTURAL RESOURCES

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#### C.1 NAS LEMOORE

##### *Prehistory*

It is generally believed that human occupation of the San Joaquin Valley dates back to at least 10,000 years before present (BP). At least one site in the valley is thought to have been occupied between 40,000 to 200,000 years BP; however, the reliability of the dating techniques used and the validity of the association of human remains with extinct fauna remains found within the site remains highly controversial. The lifeways of any inhabitants of California during the Pleistocene Epoch (pre-10,000 years BP) is largely unknown. A hunting/gathering strategy has been theorized; however, direct evidence of plant use is lacking and there are few documented relationships between tools and extinct faunal remains. No milling-related artifacts have been found within sites dating to this period. Use of wood, bone, and stone tools is thought to have occurred (Moratto 1984).

Archaeological evidence for occupation of California during the Holocene Epoch (10,000 years BP to present) is stronger. Early Holocene Period (10,000 to 8,000 years BP) sites are common throughout California. Hunter/gatherers were attracted to lacustrine and marshland settings for the varied and abundant resources found there. Milling-related artifacts are lacking during this period, but the atlatl and dart are common. Heat-treating of lithic materials for tool manufacture is also evident. Hunting of large and small game occurred, as well as fishing. Limited permanent settlements may have been established near large water sources, but a nomadic lifestyle was more common (Moratto 1984).

Milling of plant materials may have commenced later in the Holocene Epoch. Milling-related artifacts first appear in sites dating to the Early Horizon Period (8,000 to 4,000 years BP), but occur infrequently on these sites. Hunting and gathering continued during this period, especially of large game, but with greater reliance on vegetal foods. Mussels and oysters also were a staple. Greater

consumption of shellfish and increased milling activities occurred in the Middle Horizon Period (4,000 to 2,000 years BP). Use of bone artifacts increased and baked-earth steaming ovens were developed. Occupation of permanent or semi-permanent villages and reoccupation of seasonal sites was common in this period. During the Late Horizon Period (2,000 years BP to European Contact), subsistence activities became greatly diversified, exploiting a wide variety of resources. The mixed economy of this period emphasized fishing, hunting waterfowl, and collecting shellfish, roots, and seeds. Settlement of villages also increased, as did trade between different groups (Wallace 1978; Moratto 1984). During this time, regional subcultures developed, each with their own geographical territory and language or dialect.

### ***Ethnohistory***

The primary Native American group known to have used the southern San Joaquin Valley is the Southern Valley Yokuts. The Southern Valley Yokuts, geographically and linguistically distinguished from the neighboring Northern Valley and Foothill Yokuts, were divided into fifteen distinct tribes, each speaking a separate dialect of the Yokuts language and controlling a separate territory of approximately 250 square miles. The Tachi tribe occupied the territory encompassing the present-day NAS Lemoore. Each Southern Valley Yokuts tribe is estimated to have included approximately 350 people. Some tribes included only a single village, but more often several settlements comprised one tribe. Villages were occupied nearly year round, with families leaving for a few months to gather seeds and other wild plants in the spring or summer. During these times, dispersed camps were occupied near the shifting resources (Kroeber 1925; Wallace 1978).

In the villages, two types of dwellings were common. Single-family dwellings had an oval shape with a wooden frame covered with large mats of tule. Several tribes, including the Tachi, also built long, steep-roofed communal residences that sheltered 10 or more families. Each family resided in a designated portion of the structures and had their own fireplace and door. Communal cooking took place under a mat-covered porch along the front of the structure. Each settlement also had one communal sweathouse (Wallace 1978).

Subsistence practices of the Southern Valley Yokuts emphasized fishing, hunting waterfowl, and collecting shellfish, roots, and seeds. Antelope and elk were hunted from the lake shores. Wild pigeons, rabbits, and squirrels were also consumed. Large quantities of mussels were gathered and turtles were commonly eaten. Tule roots and seeds were a staple. Although acorns were not readily available in their territory, Tachi members traveled to neighboring territories to trade fish for acorns (Wallace 1978).

Mortuary practices of the Southern Valley Yokuts included burial preparation of the body by paid undertakers. The corpse was tightly bound and placed with the head to the west or northwest in a grave dug in a community cemetery. The cemetery was typically outside the village. Personal effects of the deceased were

interred with the body. Cremation was practiced when death occurred away from home. Important members of the Tachi tribe were also cremated. Charred bones were then gathered and buried in the cemetery (Wallace 1978).

The aboriginal population of the Southern Valley Yokuts has been estimated at between 5,250 and 15,700. Although contact with Europeans first occurred in the 1770s, the Southern Valley Yokuts were not drastically effected until Americans settled the valley in the mid-1800s. Many Southern Valley Yokuts were eventually settled in the Tule River Reservation, while a separate settlement for Tachi was established near NAS Lemoore. In the early 1970s, the Tachi population on the Santa Rosa Reservation near NAS Lemoore was only 100, while 325 Yokuts lived on the Tule River Reservation (Wallace 1978).

### ***History***

In 1772, Pedro Fages passed through the Southern San Joaquin Valley on his way to San Luis Obispo. Four years later, Francisco Garces, a Franciscan friar, visited the area and kept a detailed journal of his journey. Active explorations began in 1802 with the second administration of Governor Jose Arrillaga, who was eager to gain a foothold in the interior. Several expeditions occurred, beginning in 1806. During the period when Mexico ruled California (1822-1846), no rancheros were established within the southern San Joaquin Valley and Mexican influence on the Southern Yokuts were minimal (Gallegos and Associates 1997a).

Following the annexation of California by the United States in 1845, settlers quickly occupied the San Joaquin Valley. The first community was Visalia founded in 1852. The cities of Hanford and Lemoore were founded circa 1877 when the Southern Pacific Railroad was extended westward from the town of Goshen. By 1891, Lemoore was the largest wool shipping point in California (Gallegos and Associates 1997a).

NAS Lemoore was established in 1957 when the Navy acquired over 18,000 acres of agricultural land for station operations. At that time, existing farm houses and outbuildings were razed (Uribe and Associates 1994). The primary mission at NAS Lemoore includes a rapid response force of jet fighter and ground support aircraft to meet aggressor actions. The base was commissioned in 1961 and began operations during the height of the Cold War (Uribe and Associates 1994).

## **C.2 NAF EL CENTRO**

### ***Prehistory***

The prehistory of the Colorado Desert region includes three major periods of occupation: the Paleoindian Period (12,000 to 7,000 years BP), the Archaic Period (7,000 to 1,200 years BP), and the Patayan Period (1,200 years BP to European Contact). An earlier occupation has been suggested, but there is little evidence to support the claim. The Paleoindian Period is commonly known as the San Dieguito Complex. The San Dieguito populations were mobile hunter-gatherers

whose seasonal rounds covered large territories. Sites of this period are frequently on terraces overlooking major washes and extinct lake shores. In subsequent phases within this period, lithic tools become smaller and more sophisticated. Milling-related tools are absent (Moratto 1984; Apple *et al.* 1994).

During the Archaic Period, hunting and gathering continue but with greater regional specialization. Sites of this period indicate an adaptation to the drier and warmer climate of the Holocene Epoch. Lithic tools and milling-related artifacts are common. The region encompassing NAF El Centro, however, includes a relative lack of sites dating to this period. This has led debates over the possible abandonment of the area during this time (Moratto 1984; Apple *et al.* 1994).

The Patayan Period is characterized by the appearance of pottery and floodplain agriculture. During this period, small mobile groups occupied seasonal settlements along the Colorado floodplain. This period encompasses the appearance and disappearance of Lake Cahuilla (approximately 1,000 to 350 years BP, respectively). The now extinct lake is thought to have attracted people from the Colorado River who introduced new technology and pottery (Moratto 1984; Apple *et al.* 1994).

### ***Ethnohistory***

The region encompassing the present-day NAF El Centro was occupied prehistorically by the Tipai. Tipai territory included the coast shore from San Diego to Ensenada, Mexico and east as far as the Chocolate Mountains. Tipai were loosely organized into bands or autonomous tribelets. Each band controlled a portion of land with boundaries identified by natural landmarks. Communal claims were made to all springs and food resources within that land and boundaries were protected against trespassers. Permanent settlements were rare. Instead, campsites were seasonally reoccupied within a band's territory. Occasionally several bands wintered together in one location but dispersed in the spring. Winter villages included a cluster of dwellings, typically dome-shaped and thatched with brush and grass. In the summer, windbreaks, trees, or caves served as shelter. Ceremonial structures were also built within villages; however, sweatshouses were not common (Luomala 1978).

Subsistence was based on hunting and gathering with several families joining together at a campsite to gather, process, and cache vegetal foods. Seasonal rounds followed ripening plants from the valleys to the mountains. During different seasons, agave, mesquite, cactus fruits, buds and blossoms, seeds, wild fruit, acorns, and piñon nuts were gathered. Deer, snakes, and birds were hunted, but rodents provided most of the meat in the Tipai diet. Insects and larvae were also consumed. Trade of acorns, agave, mesquite, and gourds for salt, dried seaweed and other greens, and abalone shells was common with the northwestern neighboring Ipai (Luomala 1978).

Upon death, the Tipai body was laid over a pit with the head facing south or east. The corpse was cremated along with possessions of the deceased. Afterwards, the pit was either filled in or the ashes and burned bones were gathered into a pottery jar. The jar was then hidden in the mountains (Luomala 1978).

The Tipai lifestyle began to change with the establishment of the San Diego Mission in 1769. Within a decade, the mission had converted almost 1,500 Tipai and Ipai to Catholicism and had introduced agriculture as a way of life. Secularization of the missions in the 1830s resulted in Tipais becoming serfs on the large Mexican land grants given to new settlers. Others fled to the mountains and became fugitives. With American control of California, Tipai served as laborers for ranches, mines, and towns. By 1968, 12 reservations had been established exclusively for Tipai and Ipai members, with Tipai also residing on several other reservations shared by many groups. Population figures for Tipai in 1770 were estimated at 3,000 but included only mission converts. In 1968, the population numbered 1,322 (Luomala 1978).

### **History**

In 1774, Captain Juan Bautista led the first expedition from Tubac, Sonora (near Tucson, Arizona), to Alta California and established the Anza trade route. In 1781, the Quechan Indians attacked and destroyed Spanish settlements at the Yuma river crossing on the Colorado River. As a result, the Spanish abandoned this transportation route (Apple *et al.* 1994).

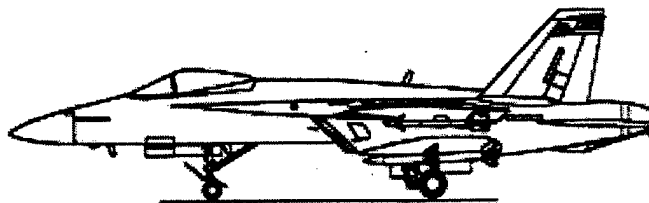
The Anza trail was reestablished during the war between the United States and Mexico. Shortly before the Treaty of Guadalupe-Hidalgo ended the war in 1848, gold was discovered in California. During the next few years, gold rush miners used the trail as an overland route. In 1859, Fort Yuma was established along the Colorado River at the route crossing below the Gila River confluence (Apple *et al.* 1994).

In 1900, investors in the California Development Company formed the Imperial Land Company to survey and develop lands to attract settlers. During the next few years, the Imperial Land Company established townsites for Imperial, Brawley, Calexico, Hever, and Silsbee. The Southern Pacific Railroad constructed a spurline from their transcontinental line at Niland south through the valley to Calexico. Soon after, the Imperial Valley experienced rapid development. In May 1901, the California Development Company opened the first irrigation canal into the valley area. By 1907, the valley had grown to the point that the citizens formed Imperial County from the eastern half of San Diego county (Apple *et al.* 1994). As a result of the construction of Boulder Dam and the All-American Canal which supplied water, Imperial Valley received increasing recognition as a agricultural center in the 1930s and 1940s (Apple *et al.* 1994).

Military facilities, which were to become NAF El Centro, were constructed near Seeley, California in 1942 and 1943 around the previously existing Civil

Aeronautical Administration airfield (Apple *et al.* 1994). The facility served as a Marine Corps Air Station during World War II and was transferred to the Navy after the war. Through the years, NAF El Centro has been designated the Naval Air Facility, the Naval Auxiliary Landing Field, the Naval Air Station, the Naval Aerospace Recovery Facility and the National Parachute Test Range (US Navy 1988a).

NAF El Centro was involved in aeronautical escape system testing, evaluation, and design for 35 years. The Naval Parachute Experimental Division began operations at NAF El Centro in 1947, and the Joint Parachute Facility was established in 1951. The United States Naval Aerospace Recovery Facility was established in 1964 and was combined with the Naval Air Facility in 1973 to form the National Parachute Test Range. The parachute test function was transferred in 1979 to the Naval Weapons Center, China Lake (US Navy 1988a).



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## APPENDIX D TRAFFIC AND CIRCULATION

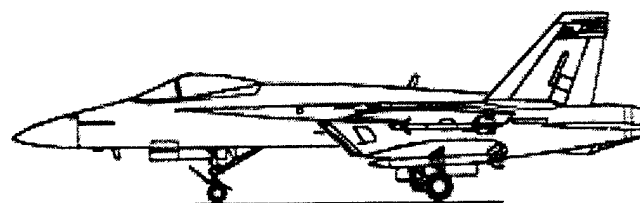
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D.1	AM AND PM PLUS F/A-18E/F TRAFFIC	D-1
D.2	AM AND PM CUMULATIVE PLUS F/A-18E/F TRAFFIC	D-25
D.3	AM AND PM MITIGATION PLUS F/A-18E/F TRAFFIC	D-50

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AM AND PM PLUS F/A-18E/F TRAFFIC

Table D-1  
Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic

AM Existing + FA18		Fri Oct 17, 1997 17:06:30		Fri Oct 17, 1997 17:06:30		Page 1-1		Page 2-1	
Traffic Impact Analysis		Traffic Impact Analysis		Traffic Impact Analysis		F/A-18 E/F Squadron Siting		F/A-18 E/F Squadron Siting	
Scenario Report		Scenario Report		Scenario Report		Trip Generation Report		Forecast for AM Personnel On-Base	
AM Existing + FA18		AM Existing + FA18		AM Existing + FA18		Amount Units		Rate	
Default		Default		Default		Subzone		In	
Existing AM		Existing AM		Existing AM		Amount Units		Out	
AM Existing		AM Existing		AM Existing		Rate		In	
Default Impact Fee		Default Impact Fee		Default Impact Fee		Rate		Out	
AM FA-18		AM FA-18		AM FA-18		Subtotal		Rate	
E2 Default		E2 Default		E2 Default		Rate		In	
Trip Distribution:		Trip Distribution:		Trip Distribution:		Rate		Out	
Paths:		Paths:		Paths:		Rate		In	
Routes:		Routes:		Routes:		Rate		Out	
Configuration:		Configuration:		Configuration:		Rate		In	
Default Configuration		Default Configuration		Default Configuration		Rate		Out	
Zone 101 Subtotal		Zone 101 Subtotal		Zone 101 Subtotal		Rate		In	
Zone 102 Subtotal		Zone 102 Subtotal		Zone 102 Subtotal		Rate		Out	
Zone 103 Subtotal		Zone 103 Subtotal		Zone 103 Subtotal		Rate		In	
Zone 201 Subtotal		Zone 201 Subtotal		Zone 201 Subtotal		Rate		Out	
Zone 202 Subtotal		Zone 202 Subtotal		Zone 202 Subtotal		Rate		In	
Zone 203 Subtotal		Zone 203 Subtotal		Zone 203 Subtotal		Rate		Out	
Zone 307 Subtotal		Zone 307 Subtotal		Zone 307 Subtotal		Rate		In	
TOTAL		TOTAL		TOTAL		Rate		Out	

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**Table D-1**  
**Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)**

AM Existing + FA18				Fri Oct 17, 1997 17:06:30				Fri Oct 17, 1997 17:06:30				Page 4-1									
				Traffic Impact Analysis				Traffic Impact Analysis													
				F/A-18 E/F Squadron Siting				F/A-18 E/F Squadron Siting													
				Trip Generation Report				Trip Generation Report													
				Forecast for AM Spouses/Dependants On-Base								Forecast for AM Personnel Off-Base									
Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total % Of Trips Total	Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total % Of Trips Total				
101	Lemoore Oper	178.00	FA 18 Spouse	0	0.30	0	53	1.6	101	Lemoore Oper	251.00	FA 18 Personnel	1.00	0.03	251	8	259				
	Zone 101 Subtotal					0	53	1.6		Zone 101 Subtotal					251	8	259				
102	Lemoore Hous	46.00	FA 18 Spouse	0	0.30	0	14	0.4	102	Lemoore Hous	64.00	FA 18 Personnel	1.00	0.03	64	2	66				
	Zone 102 Subtotal					0	14	0.4		Zone 102 Subtotal					64	2	66				
103	Lemoore Main	191.00	FA 18 Spouse	0	0.30	0	57	1.7	103	Lemoore Main	269.00	FA 18 Personnel	1.00	0.03	269	8	277				
	Zone 103 Subtotal					0	57	1.7		Zone 103 Subtotal					269	8	277				
201	Pt. Magu #2	212.00	FA 18 Spouses	0	0.30	0	64	1.9	201	Pt. Magu #2	264.00	FA 18 Personnel	1.00	0.03	264	8	272				
	Zone 201 Subtotal					0	64	1.9		Zone 201 Subtotal					264	8	272				
202	Pt. Magu #1	21.00	FA 18 Spouses	0	0.30	0	6	0.2	202	Pt. Magu #1	26.00	FA 18 Personnel	1.00	0.03	26	1	27				
	Zone 202 Subtotal					0	6	0.2		Zone 202 Subtotal					26	1	27				
203	Pt. Magu #3	191.00	FA 18 Spouses	0	0.30	0	57	1.7	203	Pt. Magu #3	238.00	FA 18 Personnel	1.00	0.03	238	7	245				
	Zone 203 Subtotal					0	57	1.7		Zone 203 Subtotal					238	7	245				
307	NAF El Centr	778.00	FA 18 Spouses	0	0.30	0	233	7.0	307	NAF El Centr	1067.00	FA 18 Personnel	1.00	0.03	1067	32	1099				
	Zone 307 Subtotal					0	233	7.0		Zone 307 Subtotal					1067	32	1099				
TOTAL								484	14.5	TOTAL								2179	66	2245	67.3

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Table D-1  
Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

AM Existing + FA18		Fri Oct 17, 1997 17:06:30		Page 5-1		AM Existing + FA18		Fri Oct 17, 1997 17:06:30		Page 6-1										
		Traffic Impact Analysis				Traffic Impact Analysis														
		F/A-18 E/F Squadron Siting				F/A-18 E/F Squadron Siting														
		Trip Generation Report				Trip Distribution Report														
		Forecast for AM Support Personnel Off-Base				Percent Of Trips E2 Default														
Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total % Of Trips	Zone	1	2	3	4	5	6	7	8	9	10	11
101	Lemoore Oper	52.00	FA 18 Support	1.00	0.03	52	2	54	1.6	23.0	47.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Zone 101 Subtotal					52	2	54	1.6	0.0	0.0	89.0	0.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0
102	Lemoore Hous	13.00	FA 18 Support	1.00	0.03	13	0	13	0.4	0.0	0.0	0.0	0.0	0.0	0.0	59.0	11.0	24.0	4.0	0.0
	Zone 102 Subtotal					13	0	13	0.4	0.0	0.0	0.0	0.0	0.0	0.0	80.0	12.0	8.0	0.0	0.0
103	Lemoore Main	55.00	FA 18 Support	1.00	0.03	55	2	57	1.7	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	68.0	7.0	0.0
	Zone 103 Subtotal					55	2	57	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0
201	Pt. Magu #2	60.00	FA 18 Support	1.00	0.03	60	2	62	1.9	12	13	14	15	16	17	18				
	Zone 201 Subtotal					60	2	62	1.9											
202	Pt. Magu #1	6.00	FA 18 Support	1.00	0.03	6	0	6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Zone 202 Subtotal					6	0	6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
203	Pt. Magu #3	54.00	FA 18 Support	1.00	0.03	54	2	56	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Zone 203 Subtotal					54	2	56	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
307	NAF El Centr	200.00	FA 18 Support	1.00	0.03	200	6	206	6.2	3.0	3.0	20.0	13.0	45.0	7.0	0.0				
	Zone 307 Subtotal					200	6	206	6.2											
TOTAL						440	14	454	13.6											

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Table D-1  
Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

AM Existing + FA18				Fri Oct 17, 1997 17:06:30				Fri Oct 17, 1997 17:06:30				Page 7-1				Page 7-2									
				Traffic Impact Analysis				Traffic Impact Analysis																	
				F/A-18 E/F Squadron Siting				F/A-18 E/F Squadron Siting																	
				Turning Movement Report																					
M Personnel On-Base + AM Spouses/Dependents On-Base + AM Personnel																									
Volume	Northbound	Southbound	Eastbound	Westbound					Volume	Northbound	Southbound	Eastbound	Westbound					Total	Total						
Type	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Volume						
<b>#38</b>																									
Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Added	0	0	0	0	298	0	0	0	0	0	0	0	0	0	0	0	0	0	298						
Total	0	0	0	0	298	0	0	0	0	0	0	0	0	0	0	0	0	0	298						
<b>#40</b>																									
Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Added	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74						
Total	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74						
<b>#44</b>																									
Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Added	0	19	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32						
Total	0	19	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32						
<b>#53</b>																									
Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Added	0	0	0	0	41	10	0	0	0	0	0	0	0	0	0	0	0	0	51						
Total	0	0	0	0	41	10	0	0	0	0	0	0	0	0	0	0	0	0	51						
<b>#55</b>																									
Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Added	0	0	0	0	3	75	0	0	0	0	0	0	0	0	0	0	0	0	78						
Total	0	0	0	0	3	75	0	0	0	0	0	0	0	0	0	0	0	0	78						
<b>#101 Jackson &amp; Main Gate</b>																									
Base	2	6	4	43	6	7	4	65	2	10	142	726	1017												
Added	0	0	0	74	0	2	7	0	0	0	0	326	409												
Total	2	6	4	117	6	9	11	65	2	10	142	1052	1426												
<b>#102 SR 198 WB Ramps &amp; Avenal Cut-Off</b>																									
Base	13	11	0	0	164	2	0	0	0	109	0	291	590												
Added	20	9	0	0	18	0	0	0	0	0	0	70	117												
Total	33	20	0	0	182	2	0	0	0	109	0	361	707												
<b>#103 SR 198 EB Ramps &amp; Avenal Cut-Off</b>																									
Base	57	3	3	261	55	1	5	1	6	4	25	424													
Added	0	29	0	0	2	16	0	0	5	0	0	52													
Total	57	32	3	263	71	1	5	6	6	4	25	476													
<b>#104 SR 41 &amp; Grangeville</b>																									
Base	261	178	13	9	230	51	61	39	14	10	254	24	1144												
Added	94	0	0	0	0	72	17	34	22	0	147	0	386												
Total	355	178	13	9	230	123	78	73	36	10	401	24	1530												

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Table D-1  
Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

AM Existing + FA18				Fri Oct 17, 1997 17:06:30				AM Existing + FA18				Fri Oct 17, 1997 17:06:30				Page 7-3				Page 8-1			
				Traffic Impact Analysis F/A-18 E/F Squadron Siting								Traffic Impact Analysis F/A-18 E/F Squadron Siting								Impact Analysis Report Level Of Service			
Volume				Northbound				Southbound				Eastbound				Westbound				Total			
Type				Left Thru Right				Left Thru Right				Left Thru Right				Left Thru Right				Volume			
#403 Alameda & Fourth				Base 488 0 69				95 32 2099				0 334 48				0 0 0				0 3165			
Added				0 0 0				0 0 0				0 0 0				0 0 0				0 0			
Total				488 0 69				95 32 2099				0 334 48				0 0 0				0 3165			
#404 Orange & First				Base 424 0 42				0 0 0				0 16 90				58 487 0				0 1117			
Added				0 0 0				0 0 0				0 0 0				0 0 0				0 0			
Total				424 0 42				0 0 0				0 16 90				58 487 0				0 1117			
#405 Orange & Third				Base 164 217 0				0 345 21				0 0 0				1256 2957 260				5220			
Added				0 0 0				0 0 0				0 0 0				0 0 0				0 0			
Total				164 217 0				0 345 21				0 0 0				1256 2957 260				5220			
#406 Orange & Fourth				Base 0 355 302				339 1288 0				32 731 64				0 0 0				0 3111			
Added				0 0 0				0 0 0				0 0 0				0 0 0				0 0			
Total				0 355 302				339 1288 0				32 731 64				0 0 0				0 3111			
#407 Orange & R.H. Dana Place				Base 9 17 110				9 11 18				14 1205 36				478 805 20				2732			
Added				0 0 0				0 0 0				0 0 0				0 0 0				0 0			
Total				9 17 110				9 11 18				14 1205 36				478 805 20				2732			

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Table D-1

## Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

AM Existing + FA18	Fri Oct 17, 1997 17:06:30	Page 9-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM Operations Method (Base Volume Alternative)		
Intersection #101 Jackson & Main Gate		
Cycle (sec):	80	Critical Vol./Cap. (X): 0.140
Loss Time (sec):	12 (Y+R = 3 sec)	Average Delay (sec/veh): 5.0
Optimal Cycle:	77	Level Of Service: A
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control:	Split Phase	Protected
Rights:	Include	Ovl
Min. Green:	3 3 3 4 4 4 3 53 53 5 55 55	
Lanes:	0 1 0 0 1 1 0 0 1 1 1 0 0 1 1 0 1 0 1	
Volume Module:		
Base Vol:	2 6 4 43 6 7 4 65 2 10 142 726	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	2 6 4 43 6 7 4 65 2 10 142 726	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	2 7 4 48 7 8 4 72 2 11 158 807	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol.:	2 7 4 48 7 8 4 72 2 11 158 807	
Saturation Flow Module:		
Sat/Lane:	1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900	
Adjustment:	0.97 0.97 0.83 0.93 0.90 0.90 0.93 0.98 0.83 0.93 0.98 0.83	
Lanes:	0.22 0.78 1.00 1.00 0.93 1.07 1.00 1.00 1.00 1.00 1.00 1.00	
Final Sat.:	410 1434 1583 1770 1599 1828 1770 1863 1583 1770 1863 1583	
Capacity Analysis Module:		
Vol/Sat:	0.00 0.00 0.00 0.03 0.00 0.00 0.00 0.04 0.00 0.01 0.08 0.51	
Crit Moves:	***	
Green/Cycle:	0.04 0.04 0.04 0.09 0.09 0.09 0.04 0.66 0.66 0.06 0.69 0.78	
Volume/Cap:	0.13 0.13 0.07 0.31 0.05 0.05 0.06 0.06 0.00 0.10 0.12 0.66	
Level Of Service Module:		
Delay/Veh:	24.1 24.1 24.0 22.5 21.6 21.6 24.0 3.1 2.9 22.9 2.8 3.6	
User DelAdj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	24.1 24.1 24.0 22.5 21.6 21.6 24.0 3.1 2.9 22.9 2.8 3.6	
Queue:	0 0 0 0 0 0 0 0 0 0 0 0	

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AM Existing + FA18	Fri Oct 17, 1997 17:06:30	Page 10-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM Operations Method (Future Volume Alternative)		
Intersection #101 Jackson & Main Gate		
Cycle (sec):	80	Critical Vol./Cap. (X): 0.200
Loss Time (sec):	12 (Y+R = 3 sec)	Average Delay (sec/veh): 17.1
Optimal Cycle:	77	Level Of Service: C
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control:	Split Phase	Protected
Rights:	Include	Ovl
Min. Green:	3 3 3 4 4 4 3 53 53 5 55 55	
Lanes:	0 1 0 0 1 1 0 0 1 1 1 0 0 1 1 0 1 0 1	
Volume Module:		
Base Vol:	2 6 4 43 6 7 4 65 2 10 142 726	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	2 6 4 43 6 7 4 65 2 10 142 726	
Added Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PasserByVol:	0 0 0 0 0 0 0 0 0 0 0 0	
Initial Fut:	2 6 4 117 6 9 11 65 2 10 142 1052	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	2 7 4 130 7 10 12 72 2 11 158 1169	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol.:	2 7 4 130 7 11 12 72 2 11 158 1169	
Saturation Flow Module:		
Sat/Lane:	1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900	
Adjustment:	0.97 0.97 0.83 0.93 0.89 0.89 0.93 0.98 0.83 0.93 0.98 0.83	
Lanes:	0.22 0.78 1.00 1.00 0.78 1.22 1.00 1.00 1.00 1.00 1.00 1.00	
Final Sat.:	410 1434 1583 1770 1318 2072 1770 1863 1583 1770 1863 1583	
Capacity Analysis Module:		
Vol/Sat:	0.00 0.00 0.00 0.07 0.01 0.01 0.01 0.04 0.00 0.01 0.08 0.74	
Crit Moves:	***	
Green/Cycle:	0.04 0.04 0.04 0.09 0.09 0.09 0.04 0.66 0.66 0.06 0.69 0.78	
Volume/Cap:	0.13 0.13 0.07 0.84 0.06 0.06 0.18 0.06 0.00 0.10 0.12 0.95	
Level Of Service Module:		
Delay/Veh:	24.1 24.1 24.0 44.6 21.6 21.6 24.2 3.1 2.9 22.9 2.8 16.6	
User DelAdj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	24.1 24.1 24.0 44.6 21.6 21.6 24.2 3.1 2.9 22.9 2.8 16.6	
Queue:	0 0 0 4 0 0 0 0 0 0 0 0	

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Table D-1  
Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

AM Existing + FA18	Fri Oct 17, 1997 17:06:30	Page 11-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report 1994 HCM Unsignalized Method (Base Volume Alternative)		
Intersection #102 SR 198 WB Ramps & Avenal Cut-Off		
Average Delay (sec/veh): 2.8 Worst Case Level Of Service: B		
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control: Uncontrolled Uncontrolled Uncontrolled Uncontrolled	Stop Sign	Stop Sign
Rights: Ignore Ignore Ignore Ignore	Include	Include
Lanes: 0 1 0 0 0 0 1 0 1 0 0 0 0 1 0 0 0 1		
Volume Module:		
Base Vol: 13 11 0 0 164 2 0 0 0 109 0 291		
Growth Adj: 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
Initial Bse: 13 11 0 0 164 0 0 0 109 0 291		
Added Vol: 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0		
Initial Fut: 33 20 0 0 182 0 0 0 109 0 361		
User Adj: 1.00 1.00 0.00 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00		
PHF Adj: 0.90 0.90 0.00 0.90 0.90 0.00 0.90 0.90 0.90 0.90 0.90		
PHF Volume: 37 22 0 0 202 0 0 0 121 0 401		
Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0		
Final Vol: 37 22 0 0 202 0 0 0 121 0 401		
Adjusted Volume Module:		
Grade: 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%		
% Cycle/Cars: 1.10 1.00 1.00 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10		
% Truck/Comb: 1.10 1.00 1.00 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10		
PCE Adj: 1.10 1.00 1.00 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10		
Cycl/Car PCE: 1.10 1.00 1.00 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10		
Trck/Comb PCE: 1.10 1.00 1.00 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10		
Adj Vol: 40 22 0 0 202 0 0 0 133 0 441		
Critical Gap Module:		
MoveUp Time: 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1		
Critical Gp: 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0		
Capacity Module:		
Conflict Vol: 182 182 182 182 182 182 182 182 182 182 182		
Potent Cap: 1404 1404 1404 1404 1404 1404 1404 1404 1404 1404 1404		
Adj Cap: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
Move Cap: 1404 1404 1404 1404 1404 1404 1404 1404 1404 1404 1404		
Level Of Service Module:		
Stopped Del: 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6		
LOS by Move: A A A A A A A A A A A		
Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT		
Shared Cap: 1404 1404 1404 1404 1404 1404 1404 1404 1404 1404 1404		
Shrd StpDel: 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6		
Shared LOS: 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5		
ApproachDel: 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5		
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Table D-1  
Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

AM Existing + FA18	Fri Oct 17, 1997 17:06:30	Page 13-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM Unsignalized Method (Base Volume Alternative)		
Intersection #103 SR 198 EB Ramps & Avenal Cut-Off		
Average Delay (sec/veh): 1.0 Worst Case Level Of Service: B		
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control:	Uncontrolled	Stop Sign
Rights:	Ignore	Include
Lanes:	1 0 1 0 1 1 0 1 0 1 0 1 0 1 0 1	0 1 0 0 1
Volume Module:		
Base Vol:	57 3 3 3 261 55 1 5 1 6 4 25	
Growth Adj:	1.00 1.00 0.00 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	57 3 3 3 261 0 1 5 1 6 4 25	
User Adj:	1.00 1.00 0.00 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.00 0.90 0.90 0.00 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	63 3 3 3 290 0 1 6 1 7 4 28	
Reduct Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
Final Vol:	63 3 3 3 290 0 1 6 1 7 4 28	
Adjusted Volume Module:		
Grade:	0%	0%
% Cycle/Cars:	xxxx xxxx	xxxx xxxx
% Truck/Comb:	xxxx xxxx	xxxx xxxx
PCE Adj:	1.10 1.00 1.00 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10	
Cycl/Car PCE:	xxxx xxxx	xxxx xxxx
Truck/Comb PCE:	xxxx xxxx	xxxx xxxx
Adj Vol:	70 3 0 4 290 0 1 6 1 7 5 31	
Critical Gap Module:		
MoveUp Time:	2.1 xxxx xxxx	3.4 3.3 2.6 3.4 3.3 2.6
Critical Gp:	5.0 xxxx xxxx	6.5 6.0 5.5 6.5 6.0 5.5
Capacity Module:		
Conflict Vol:	3 xxxx xxxx	376 360 290 363 360 3
Potent Cap:	1247 xxxx xxxx	641 706 987 652 706 1379
Adj Cap:	1.00 xxxx xxxx	0.93 0.94 1.00 0.95 0.94 1.00
Move Cap:	1247 xxxx xxxx	596 665 987 618 665 1379
Level Of Service Module:		
Stopped Del:	3.0 xxxx xxxx	6.1 5.5 3.7 5.9 5.4 2.7
LOS by Move:	A *	B A *
Movement:	LT - LTR - RT	LT - LTR - RT
Shared Cap:	xxxx xxxx xxxx	653 xxxx xxxx
Shrd StpDel:	xxxx xxxx xxxx	5.6 xxxx xxxx
Shred LOS:	*	B *
ApproachDel:	2.9	0.0 5.3 3.5
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AM Existing + FA18	Fri Oct 17, 1997 17:06:30	Page 14-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM Unsignalized Method (Future Volume Alternative)		
Intersection #103 SR 198 EB Ramps & Avenal Cut-Off		
Average Delay (sec/veh): 1.0 Worst Case Level Of Service: B		
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control:	Uncontrolled	Stop Sign
Rights:	Ignore	Include
Lanes:	1 0 1 0 1 1 0 1 0 1 0 1 0 1 0 1	0 1 0 0 1
Volume Module:		
Base Vol:	57 3 3 3 261 55 1 5 1 6 4 25	
Growth Adj:	1.00 1.00 0.00 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	57 3 3 3 261 0 1 5 1 6 4 25	
User Adj:	1.00 1.00 0.00 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.00 0.90 0.90 0.00 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	63 3 3 3 292 0 1 6 1 7 4 28	
Reduct Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
Final Vol:	63 3 3 3 292 0 1 6 1 7 4 28	
Adjusted Volume Module:		
Grade:	0%	0%
% Cycle/Cars:	xxxx xxxx	xxxx xxxx
% Truck/Comb:	xxxx xxxx	xxxx xxxx
PCE Adj:	1.10 1.00 1.00 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10	
Cycl/Car PCE:	xxxx xxxx	xxxx xxxx
Truck/Comb PCE:	xxxx xxxx	xxxx xxxx
Adj Vol:	70 36 0 4 292 0 1 6 1 7 5 31	
Critical Gap Module:		
MoveUp Time:	2.1 xxxx xxxx	3.4 3.3 2.6 3.4 3.3 2.6
Critical Gp:	5.0 xxxx xxxx	6.5 6.0 5.5 6.5 6.0 5.5
Capacity Module:		
Conflict Vol:	292 xxxx xxxx	36 xxxx xxxx
Potent Cap:	1244 xxxx xxxx	1649 xxxx xxxx
Adj Cap:	1.00 xxxx xxxx	0.93 0.94 1.00 0.94 0.94 1.00
Move Cap:	1244 xxxx xxxx	1649 xxxx xxxx
Level Of Service Module:		
Stopped Del:	3.0 xxxx xxxx	6.3 5.7 3.7 6.2 5.7 2.8
LOS by Move:	A *	B A *
Movement:	LT - LTR - RT	LT - LTR - RT
Shared Cap:	xxxx xxxx xxxx	625 xxxx xxxx
Shrd StpDel:	xxxx xxxx xxxx	5.8 xxxx xxxx
Shred LOS:	*	B *
ApproachDel:	2.0	0.0 4.7 3.7
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Table D-1  
Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

AM Existing + FA18	Fri Oct 17, 1997 17:06:30	Page 17-1					
Traffic Impact Analysis F/A-18 E/F Squadron Siting							
Level Of Service Computation Report 1994 HCM 4-Way Stop Method (Base Volume Alternative)							
Intersection #301 Evan Hewes & Drew							
Cycle (sec):	1	Critical Vol./Cap. (X): 0.350					
Loss time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 2.9					
Optimal Cycle:	0	Level Of Service: A					
Approach:	North Bound	East Bound	West Bound				
Movement:	L - T - R	L - T - R	L - T - R				
Control:	Stop Sign	Stop Sign	Stop Sign				
Rights:	Include	Include	Include				
Lanes:	0 0 1 0 0	0 0 1 0 0	0 1 0 1 0				
Volume Module:							
Base Vol:	123	14	23	39	23	104	6
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	123	14	23	39	23	104	6
User Adj:	0	0	0	0	0	0	0
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	137	16	26	39	26	116	7
Reduc Vol:	0	0	0	0	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol:	137	16	26	39	26	116	7
Saturation Flow Module:							
Sat/Lane:	512	512	291	208	208	284	284
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.77	0.09	0.14	0.33	0.50	0.17	0.18
Final Sat:	392	46	74	97	146	49	37
Capacity Analysis Module:							
Vol/Sat:	0.35	0.35	0.35	0.16	0.16	0.22	0.22
Crit Moves:	0.35	0.35	0.35	0.22	0.22	0.26	0.26
ApproachV/S:	0.35	0.35	0.35	0.22	0.22	0.26	0.26
Level Of Service Module:							
Delay/Veh:	3.8	3.8	1.9	1.9	2.3	2.3	2.7
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	3.8	3.8	1.9	1.9	2.3	2.3	2.7
LOS by Move:	A	A	A	A	A	A	A
ApproachDel:	3.8	3.8	1.9	1.9	2.3	2.3	2.7
LOS by Appr:	A	A	A	A	A	A	A

AM Existing + FA18	Fri Oct 17, 1997 17:06:30	Page 18-1					
Traffic Impact Analysis F/A-18 E/F Squadron Siting							
Level Of Service Computation Report 1994 HCM 4-Way Stop Method (Future Volume Alternative)							
Intersection #301 Evan Hewes & Drew							
Cycle (sec):	1	Critical Vol./Cap. (X): 0.683					
Loss time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 6.8					
Optimal Cycle:	0	Level Of Service: B					
Approach:	North Bound	South Bound	East Bound	West Bound			
Movement:	L - T - R	L - T - R	L - T - R	L - T - R			
Control:	Stop Sign	Stop Sign	Stop Sign	Stop Sign			
Rights:	Include	Include	Include	Include			
Lanes:	0 0 1 0 0	0 0 1 0 0	0 1 0 1 0	0 1 0 1 0			
Volume Module:							
Base Vol:	123	14	23	39	23	104	6
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	123	14	23	39	23	104	6
User Adj:	0	0	0	0	0	0	0
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	137	16	26	39	26	116	7
Reduc Vol:	0	0	0	0	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol:	137	16	26	39	26	116	7
Saturation Flow Module:							
Sat/Lane:	325	325	325	270	270	299	299
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.62	0.07	0.31	0.65	0.26	0.09	0.07
Final Sat:	201	23	101	211	86	29	20
Capacity Analysis Module:							
Vol/Sat:	0.68	0.68	0.68	0.28	0.41	0.41	0.33
Crit Moves:	0.68	0.68	0.68	0.28	0.41	0.33	0.33
ApproachV/S:	0.68	0.68	0.68	0.28	0.41	0.33	0.33
Level Of Service Module:							
Delay/Veh:	13.4	13.4	13.4	2.9	2.9	4.7	4.7
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	13.4	13.4	13.4	2.9	2.9	4.7	4.7
LOS by Move:	C	C	C	A	A	A	A
ApproachDel:	13.4	13.4	13.4	2.9	2.9	4.7	4.7
LOS by Appr:	C	C	C	A	A	A	A

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Table D-1

## Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

AM Existing + FA18		Fri Oct 17, 1997 17:06:31		Page 19-1	
Traffic Impact Analysis		F/A-18 E/F Squadron Siting		Page 20-1	
Level Of Service Computation Report		1994 HCM 4-Way Stop Method (Base Volume Alternative)		1994 HCM 4-Way Stop Method (Future Volume Alternative)	
Intersection #302 Evan Hewes & Bennett		Critical Vol./Cap. (X):		Critical Vol./Cap. (X):	
Cycle (sec):		0 (Y+R = 4 sec)		0 (Y+R = 4 sec)	
Loss Time (sec):		0		0	
Optimal Cycle:		2.5		2.5	
Level Of Service:		A		F	
Approach:		North Bound		South Bound	
Movement:		L - T - R		L - T - R	
Control:		Stop Sign		Stop Sign	
Rights:		Include		Include	
Lanes:		0 0 1 0 0		0 0 1 0 0	
Volume Module:		0 27 0 25 10 11 17 90 1		0 27 0 25 10 11 17 90 1	
Base Vol:		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Growth Adj:		0 27 0 25 10 11 17 90 1		0 27 0 25 10 11 17 90 1	
Initial Bse:		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
User Adj:		0 27 0 25 10 11 17 90 1		0 27 0 25 10 11 17 90 1	
PHF Adj:		0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90		0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:		0 30 0 28 11 12 19 100 1		0 30 0 28 11 12 19 100 1	
Reduced Vol:		0 0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0 0	
PCE Adj:		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:		0 30 0 28 11 12 19 100 1		0 30 0 28 11 12 19 100 1	
Saturation Flow Module:		98 98 98 264 264 264 437 437 437		98 98 98 264 264 264 437 437 437	
Sat/Lane:		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Adjustment:		0.00 1.00 0.00 0.72 0.28 1.00 1.00 0.99 0.01		0.00 1.00 0.00 0.72 0.28 1.00 1.00 0.99 0.01	
Lanes:		0 98 0 190 74 264 437 433 4		0 98 0 190 74 264 437 433 4	
Final Sat:		0.00 0.31 0.00 0.15 0.15 0.05 0.04 0.23 0.23		0.00 0.31 0.00 0.15 0.15 0.05 0.04 0.23 0.23	
Capacity Analysis Module:		0.00 0.31 0.00 0.15 0.15 0.05 0.04 0.23 0.23		0.00 0.31 0.00 0.15 0.15 0.05 0.04 0.23 0.23	
Vol/Sat:		0.00 0.31 0.00 0.15 0.15 0.05 0.04 0.23 0.23		0.00 0.31 0.00 0.15 0.15 0.05 0.04 0.23 0.23	
Crit Moves:		0.31		0.31	
ApproachV/S:		0.10 0.14		0.10 0.14	
Level Of Service Module:		0.0 3.2 0.0 1.8 1.8 1.2 1.2 2.4 2.4		0.0 3.2 0.0 1.8 1.8 1.2 1.2 2.4 2.4	
Delay/Veh:		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:		0.0 3.2 0.0 1.8 1.8 1.2 1.2 2.4 2.4		0.0 3.2 0.0 1.8 1.8 1.2 1.2 2.4 2.4	
LOS by Move:		A A A A A A A A		A A A A A A A A	
ApproachDel:		3.2 A 1.4 A 1.7 A		3.2 A 1.4 A 1.7 A	
LOS by Appr:		A A A A		A A A A	
LOS by Appr:		A A A A		A A A A	

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Table D-1  
Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

AM Existing + FA18	Fri Oct 17, 1997 17:06:31	Page 21-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM 4-Way Stop Method (Base Volume Alternative)		
Intersection #303 Evan Hewes & Forrester		
Cycle (sec):	1	Critical Vol./Cap. (X): 0.649
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 4.9
Optimal Cycle:	0	Level Of Service: A
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control:	Stop Sign	Stop Sign
Rights:	Include	Include
Lanes:	0 0 1 0 0 0 0 1 0 0 1 0 0 1 0 0 1 0	1 0 0 1 0 1 0 0 1 0
Volume Module:		
Base Vol:	15 65 11 30 107 38 22 156 17 104 110 12	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	15 65 11 30 107 38 22 156 17 104 110 12	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	17 72 12 33 119 42 24 173 19 116 122 13	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	17 72 12 33 119 42 24 173 19 116 122 13	
Saturation Flow Module:		
Sat/Lane:	334 334 353 353 296 296 296 358 358 358	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.17 0.71 0.12 0.17 0.61 0.22 1.00 0.90 0.10 1.00 0.90 0.10	
Final Sat:	56 238 40 60 217 76 296 267 29 358 324 34	
Capacity Analysis Module:		
Vol/Sat:	0.30 0.30 0.30 0.55 0.55 0.55 0.08 0.65 0.65 0.32 0.38 0.38	
Crit Moves:	***	***
ApproachV/S:	0.30 0.55	0.36
Level Of Service Module:		
Delay/Veh:	3.2 3.2 3.2 8.1 8.1 8.1 1.4 11.8 11.8 3.4 4.2 4.2	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	3.2 3.2 3.2 8.1 8.1 8.1 1.4 11.8 11.8 3.4 4.2 4.2	
LOS by Move:	A A A B B B A C C A A A	
ApproachDel:	3.2 3.2 3.2 8.1 8.1 8.1 4.0 3.8	
LOS by Appr:	A A A B B B A	

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AM Existing + FA18	Fri Oct 17, 1997 17:06:31	Page 22-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM 4-Way Stop Method (Future Volume Alternative)		
Intersection #303 Evan Hewes & Forrester		
Cycle (sec):	1	Critical Vol./Cap. (X): 2.116
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 646.4
Optimal Cycle:	0	Level Of Service: F
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control:	Stop Sign	Stop Sign
Rights:	Include	Include
Lanes:	0 0 1 0 0 0 0 1 0 0 1 0 0 1 0 0 1 0	1 0 0 1 0 1 0 0 1 0
Volume Module:		
Base Vol:	15 65 11 30 107 38 22 156 17 104 110 12	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	15 65 11 30 107 38 22 156 17 104 110 12	
User Adj:	0 0 0 0 0 0 0 0 0 0 0 0	
PHF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Volume:	118 72 12 33 119 231 69 328 43 116 774 13	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
Reduced Vol:	118 72 12 33 119 231 69 328 43 116 774 13	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	118 72 12 33 119 231 69 328 43 116 774 13	
Saturation Flow Module:		
Sat/Lane:	410 410 410 181 181 181 384 384 384 424 424 424	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.58 0.36 0.06 0.09 0.31 0.60 1.00 0.88 0.12 1.00 0.98 0.02	
Final Sat:	240 146 24 16 56 109 384 339 45 424 417 7	
Capacity Analysis Module:		
Vol/Sat:	0.49 0.49 0.49 2.12 2.12 2.12 0.18 0.97 0.97 0.27 1.86 1.86	
Crit Moves:	***	***
ApproachV/S:	0.49 2.12	0.57
Level Of Service Module:		
Delay/Veh:	6.5 6.5 6.5 3105 3105 3105 2.0 39.3 39.3 2.8 1157 1157	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	6.5 6.5 6.5 3105 3105 3105 2.0 39.3 39.3 2.8 1157 1157	
LOS by Move:	B B B F F F A E E A F F	
ApproachDel:	6.5 6.5 6.5 3105.4 8.8	
LOS by Appr:	B B B F F B	

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**Table D-1**  
**Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)**

PM Existing + FA18		Fri Oct 17, 1997 17:07:19		Fri Oct 17, 1997 17:07:19		Page 1-1		Page 2-1	
		Traffic Impact Analysis F/A-18 E/F Squadron Siting		Traffic Impact Analysis F/A-18 E/F Squadron Siting					
Scenario:		Scenario Report		Trip Generation Report					
PM Existing + FA18		PM Existing + FA18		Forecast for PM Personnel On-Base					
Command:		Default							
Volume:		Existing PM							
Geometry:		PM Existing							
Impact Fee:		Default Impact Fee							
Trip Generation:		PM FA-18							
Trip Distribution:		E2 Default							
Paths:		Default Paths							
Routes:		Default Routes							
Configuration:		Default Configuration							
Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total Trips	Total % Of Trips
101	Lemoore Oper	433.00	FA 18 Personnel	0.04	0.04	17	17	34	1.0
	Zone 101 Subtotal					17	17	34	1.0
102	Lemoore Hous	111.00	FA 18 Personnel	0.04	0.04	4	4	8	0.2
	Zone 102 Subtotal					4	4	8	0.2
103	Lemoore Main	464.00	FA 18 Personnel	0.04	0.04	19	19	38	1.1
	Zone 103 Subtotal					19	19	38	1.1
201	Pt. Magu #2	452.00	FA 18 Personnel	0.04	0.04	18	18	36	1.0
	Zone 201 Subtotal					18	18	36	1.0
202	Pt. Magu #1	45.00	FA 18 Personnel	0.04	0.04	2	2	4	0.1
	Zone 202 Subtotal					2	2	4	0.1
203	Pt. Magu #3	407.00	FA 18 Personnel	0.04	0.04	16	16	32	0.9
	Zone 203 Subtotal					16	16	32	0.9
307	NAF El Centr	1890.00	FA 18 Personnel	0.04	0.04	76	76	152	4.4
	Zone 307 Subtotal					76	76	152	4.4
TOTAL						152	152	304	8.7

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Table D-1  
Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

PM Existing + FA18				Fri Oct 17, 1997 17:07:19				PM Existing + FA18				Fri Oct 17, 1997 17:07:19				Page 3-1				Page 4-1			
				Traffic Impact Analysis				Traffic Impact Analysis				Traffic Impact Analysis											
				F/A-18 E/F Squadron Siting				F/A-18 E/F Squadron Siting				F/A-18 E/F Squadron Siting											
				Trip Generation Report				Trip Generation Report				Trip Generation Report											
				Forecast for PM Spouses/Dependants On-Base				Forecast for PM Personnel Off-Base				Forecast for PM Personnel Off-Base											
Zone #	Subzone	Amount	Units	Rate	In	Out	Trips	Trips	Rate	In	Out	Trips	Trips	Rate	In	Out	Trips	Trips	Rate	In	Out	Trips	Total % Of Trips Total
101	Lemoore Oper	178.00	FA 18 Spouse	0	0.30	0.00	53	0	0.30	0.00	0.00	53	0	0.30	0.00	0.00	53	0	0.30	0.00	0.00	53	1.5
	Zone 101 Subtotal						53	0				53	0				53	0				53	1.5
102	Lemoore Hous	46.00	FA 18 Spouse	0	0.30	0.00	14	0	0.30	0.00	0.00	14	0	0.30	0.00	0.00	14	0	0.30	0.00	0.00	14	0.4
	Zone 102 Subtotal						14	0				14	0				14	0				14	0.4
103	Lemoore Main	191.00	FA 18 Spouse	0	0.30	0.00	57	0	0.30	0.00	0.00	57	0	0.30	0.00	0.00	57	0	0.30	0.00	0.00	57	1.6
	Zone 103 Subtotal						57	0				57	0				57	0				57	1.6
201	Pt. Magu #2	212.00	FA 18 Spouses		0.30	0.00	64	0	0.30	0.00	0.00	64	0	0.30	0.00	0.00	64	0	0.30	0.00	0.00	64	1.8
	Zone 201 Subtotal						64	0				64	0				64	0				64	1.8
202	Pt. Magu #1	21.00	FA 18 Spouses		0.30	0.00	6	0	0.30	0.00	0.00	6	0	0.30	0.00	0.00	6	0	0.30	0.00	0.00	6	0.2
	Zone 202 Subtotal						6	0				6	0				6	0				6	0.2
203	Pt. Magu #3	191.00	FA 18 Spouses		0.30	0.00	57	0	0.30	0.00	0.00	57	0	0.30	0.00	0.00	57	0	0.30	0.00	0.00	57	1.6
	Zone 203 Subtotal						57	0				57	0				57	0				57	1.6
307	NAF El Centr	778.00	FA 18 Spouses		0.30	0.00	233	0	0.30	0.00	0.00	233	0	0.30	0.00	0.00	233	0	0.30	0.00	0.00	233	6.7
	Zone 307 Subtotal						233	0				233	0				233	0				233	6.7
TOTAL							484	0				484	0				484	0				484	13.9
TOTAL																	66	2179				2245	64.4

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Table D-1  
Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

PM Existing + FA18										Fri Oct 17, 1997 17:07:19										Page 5-1									
										Traffic Impact Analysis																			
F/A-18 E/F Squadron Siting																													
										Trip Generation Report																			
Forecast for PM Support Personnel Off-Base																													
Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total Trips	Total % Of Trips Total																				
101	Lemoore Oper	52.00	FA 18 Support	0.03	1.00	2	52	54	1.5																				
	Zone 101 Subtotal					2	52	54	1.5																				
102	Lemoore Hous	13.00	FA 18 Support	0.03	1.00	0	13	13	0.4																				
	Zone 102 Subtotal					0	13	13	0.4																				
103	Lemoore Main	55.00	FA 18 Support	0.03	1.00	2	55	57	1.6																				
	Zone 103 Subtotal					2	55	57	1.6																				
201	Pt. Magu #2	60.00	FA 18 Support	0.03	1.00	2	60	62	1.8																				
	Zone 201 Subtotal					2	60	62	1.8																				
202	Pt. Magu # 1	6.00	FA 18 Support	0.03	1.00	0	6	6	0.2																				
	Zone 202 Subtotal					0	6	6	0.2																				
203	Pt. Magu #3	54.00	FA 18 Support	0.03	1.00	2	54	56	1.6																				
	Zone 203 Subtotal					2	54	56	1.6																				
307	NAF El Centr	200.00	FA 18 Support	0.03	1.00	6	200	206	5.9																				
	Zone 307 Subtotal					6	200	206	5.9																				
TOTAL																													

PM Existing + FA18										Fri Oct 17, 1997 17:07:19										Page 6-1											
										Traffic Impact Analysis																					
F/A-18 E/F Squadron Siting																															
										Trip Distribution Report																					
Percent Of Trips E2 Default																															
Zone	1	2	3	4	5	6	7	8	9	10	11																				
101	23.0	47.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																				
102	0.0	0.0	89.0	0.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0																				
103	0.0	0.0	92.0	0.0	6.0	2.0	0.0	0.0	0.0	0.0	0.0																				
201	0.0	0.0	0.0	0.0	0.0	0.0	59.0	11.0	24.0	4.0	0.0																				
202	0.0	0.0	0.0	0.0	0.0	0.0	80.0	12.0	8.0	0.0	0.0																				
203	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	68.0	7.0	0.0																				
307	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0																				
Zone	12	13	14	15	16	17	18																								
101	0.0	0.0	0.0	0.0	0.0	0.0	0.0																								
102	0.0	0.0	0.0	0.0	0.0	0.0	0.0																								
103	0.0	0.0	0.0	0.0	0.0	0.0	0.0																								
201	0.0	0.0	0.0	0.0	0.0	0.0	2.0																								
202	0.0	0.0	0.0	0.0	0.0	0.0	0.0																								
203	0.0	0.0	0.0	0.0	0.0	0.0	0.0																								
307	3.0	3.0	20.0	13.0	45.0	7.0	0.0																								

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**Table D-1**  
**Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)**

PM Existing + FA18		Fri Oct 17, 1997 17:07:19		PM Existing + FA18		Fri Oct 17, 1997 17:07:19		Page 7-1		Page 7-2	
		Traffic Impact Analysis F/A-18 E/F Squadron Siting				Traffic Impact Analysis F/A-18 E/F Squadron Siting					
M Personnel On-Base + PM Spouses/Dependants On-Base + PM Personnel Off-Base + P		Turning Movement Report									
Volume	Northbound	Southbound	Eastbound	Volume	Northbound	Southbound	Eastbound	Volume	Northbound	Southbound	Eastbound
Type	Left Thru Right	Left Thru Right	Left Thru Right	Type	Left Thru Right	Left Thru Right	Left Thru Right	Type	Left Thru Right	Left Thru Right	Left Thru Right
<b>#38</b>											
Base	0	0	0	0	0	0	0	Base	0	180	2
Added	0	0	0	0	0	0	0	Added	0	7	14
Total	0	0	0	0	0	0	0	Total	0	187	16
<b>#40</b>											
Base	0	0	0	0	0	0	0	Base	0	176	377
Added	0	0	0	0	0	0	0	Added	0	21	271
Total	0	0	0	0	0	0	0	Total	0	197	648
<b>#44</b>											
Base	0	0	0	0	0	0	0	Base	0	20	70
Added	0	0	0	0	0	0	0	Added	22	31	0
Total	0	0	0	0	0	0	0	Total	42	101	0
<b>#53</b>											
Base	0	0	0	0	0	0	0	Base	7	14	0
Added	0	0	0	0	0	0	0	Added	1	22	0
Total	0	0	0	0	0	0	0	Total	8	36	0
<b>#55</b>											
Base	0	0	0	0	0	0	0	Base	8	0	130
Added	0	0	0	0	0	0	0	Added	6	0	0
Total	0	0	0	0	0	0	0	Total	14	0	130
<b>#101 Jackson &amp; Main Gate</b>											
Base	3	6	4	529	6	10	5	Base	17	30	20
Added	0	0	0	336	0	7	2	Added	0	0	10
Total	3	6	4	865	6	17	7	Total	17	30	30
<b>#102 SR 198 WB Ramps &amp; Avenal Cut-Off</b>											
Base	9	6	0	0	322	3	0	Base	1	1	116
Added	5	2	0	0	81	0	0	Added	0	69	0
Total	14	8	0	0	403	3	0	Total	1	70	1
<b>#103 SR 198 EB Ramps &amp; Avenal Cut-Off</b>											
Base	197	1	6	7	76	300	3	Base	19	90	14
Added	0	7	0	0	9	72	0	Added	24	0	0
Total	197	8	6	7	85	372	3	Total	43	90	14
<b>#104 SR 41 &amp; Grangeville</b>											
Base	109	254	21	18	198	33	166	Base	19	90	14
Added	24	0	0	0	18	74	150	Added	24	0	0
Total	133	254	21	18	198	51	240	Total	43	90	14
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<b>#201 Navalair &amp; SR 1 SB Ramps</b>											
Base	0	180	2	2	84	0	0	Base	0	180	2
Added	0	7	14	0	2	0	0	Added	0	7	14
Total	0	187	16	2	86	0	0	Total	0	187	16
<b>#202 Navalair &amp; Wood</b>											
Base	0	176	377	8	197	0	0	Base	0	176	377
Added	0	21	271	0	63	0	0	Added	0	21	271
Total	0	197	648	8	260	0	0	Total	0	197	648
<b>#203 N. Mugu &amp; Frontage</b>											
Base	20	70	0	0	24	172	473	Base	20	70	0
Added	22	31	0	0	8	70	260	Added	22	31	0
Total	42	101	0	0	32	242	733	Total	42	101	0
<b>#204 Main &amp; Frontage</b>											
Base	7	14	0	0	15	25	83	Base	7	14	0
Added	1	22	0	0	82	8	31	Added	1	22	0
Total	8	36	0	0	97	33	114	Total	8	36	0
<b>#205 Las Posas &amp; SR 1 NB Off Ramp</b>											
Base	8	0	130	0	0	0	0	Base	8	0	130
Added	6	0	0	0	0	0	0	Added	6	0	0
Total	14	0	130	0	0	0	0	Total	14	0	130
<b>#301 Evan Hewes &amp; Drew</b>											
Base	17	30	20	18	19	20	21	Base	17	30	20
Added	0	0	10	10	0	0	0	Added	0	0	10
Total	17	30	30	28	19	20	21	Total	17	30	30
<b>#302 Evan Hewes &amp; Bennett</b>											
Base	1	1	1	116	32	22	7	Base	1	1	116
Added	0	69	0	873	269	201	52	Added	0	69	0
Total	1	70	1	989	301	223	59	Total	1	70	1
<b>#303 Evan Hewes &amp; Forrester</b>											
Base	19	90	14	31	151	15	51	Base	19	90	14
Added	24	0	0	0	45	175	604	Added	24	0	0
Total	43	90	14	31	151	60	226	Total	43	90	14
<b>#401 Alameda &amp; First</b>											
Base	48	0	27	0	0	0	0	Base	48	0	27
Added	0	0	0	0	0	0	0	Added	0	0	0
Total	48	0	27	0	0	0	0	Total	48	0	27
<b>#402 Alameda &amp; Third</b>											
Base	0	0	0	0	673	0	0	Base	0	0	0
Added	0	0	0	0	0	0	0	Added	0	0	0
Total	0	0	0	0	673	0	0	Total	0	0	0
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Table D-1  
Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

PM Existing + FA18		Fri Oct 17, 1997 17:07:19				Page 7-3		PM Existing + FA18		Fri Oct 17, 1997 17:07:19				Page 8-1	
		Traffic Impact Analysis F/A-18 E/F Squadron Siting						Traffic Impact Analysis F/A-18 E/F Squadron Siting							
		Southbound		Eastbound		Westbound		Southbound		Eastbound		Westbound		Level Of Service	
Volume	Northbound	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Intersection	Change
Type	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Volume		in
<b>#403 Alameda &amp; Fourth</b>															
Base	85	0	106	488	249	413	0	1972	318	0	0	0	0	3631	
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	85	0	106	488	249	413	0	1972	318	0	0	0	0	3631	
<b>#404 Orange &amp; First</b>															
Base	117	0	201	0	0	0	0	217	201	228	127	0	1091		
Added	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total	117	0	201	0	0	0	0	217	201	228	127	0	1091		
<b>#405 Orange &amp; Third</b>															
Base	111	403	0	0	615	27	0	0	0	1002	647	80	2885		
Added	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total	111	403	0	0	615	27	0	0	0	1002	647	80	2885		
<b>#406 Orange &amp; Fourth</b>															
Base	0	482	498	376	1166	0	21	2597	85	0	0	0	5225		
Added	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total	0	482	498	376	1166	0	21	2597	85	0	0	0	5225		
<b>#407 Orange &amp; R.H. Dana Place</b>															
Base	87	63	560	47	38	66	68	1042	74	175	673	41	2934		
Added	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total	87	63	560	47	38	66	68	1042	74	175	673	41	2934		

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Table D-1  
Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

PM Existing + FA18	Mon Oct 20, 1997 15:42:27	Page 9-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report 1994 HCM Operations Method (Base Volume Alternative)		
Intersection #101 Jackson & Main Gate		
Cycle (sec): 80	Critical Vol./Cap. (X): 0.344	
Loss Time (sec): 12 (Y+R = 3 sec)	Average Delay (sec/veh): 11.5	
Optimal Cycle: 80	Level Of Service: B	
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control: Split Phase Split Phase Split Phase Split Phase	Protected Include Protected Protected	Ovl
Rights: 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		
Min. Green: 0 1 0 0 1 1 1 0 0 1 1 0 0 1 1 0 2 3 7 37		
Lanes: 0 1 0 0 1 1 1 0 0 1 1 0 0 1 1 0 2 0 1		
Volume Module:		
Base Vol: 3 6 4 529 6 10 5 184 2 2 131 116		
Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
Initial Bse: 3 6 4 529 6 10 5 184 2 2 131 116		
User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
PHF Adj: 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90		
PHF Volume: 3 7 4 588 7 11 6 204 2 2 146 129		
Reduced Vol: 0 0 0 0 0 0 0 0 0 0 0 0		
PCE Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
MLF Adj: 1.00 1.00 1.00 1.05 1.05 1.00 1.00 1.00 1.00 1.00 1.05 1.00		
Final Vol.: 3 7 4 617 7 11 6 204 2 2 153 129		
Saturation Flow Module:		
Sat/Lane: 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900		
Adjustment: 0.97 0.97 0.83 0.93 0.93 0.83 0.93 0.98 0.83 0.93 0.98 0.83		
Lanes: 0.30 0.70 1.00 1.98 0.02 1.00 1.00 1.00 1.00 1.00 2.00 1.00		
Final Sat.: 553 1291 1583 3500 40 1583 1770 1863 1583 1770 3725 1583		
Capacity Analysis Module:		
Vol/Sat: 0.01 0.01 0.00 0.18 0.18 0.01 0.00 0.11 0.00 0.00 0.04 0.08		
Crit Moves: ****		
Green/Cycle: 0.03 0.03 0.03 0.31 0.31 0.31 0.05 0.49 0.49 0.03 0.46 0.77		
Volume/Cap: 0.22 0.22 0.10 0.56 0.56 0.02 0.07 0.22 0.00 0.05 0.09 0.11		
Level Of Service Module:		
Delay/Veh: 25.1 25.1 24.7 15.3 15.3 12.3 23.4 7.6 6.8 24.6 7.8 1.4		
User DelAdj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
AdjDel/Veh: 25.1 25.1 24.7 15.3 15.3 12.3 23.4 7.6 6.8 24.6 7.8 1.4		
Queue: 0 0 0 12 0 0 3 0 0 0 0 2		
*****		
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Table D-1  
Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

PM Existing + FA18	Fri Oct 17, 1997 17:07:19	Page 11-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report 1994 HCM Unsignalized Method (Base Volume Alternative)		
Intersection #102 SR 198 WB Ramps & Avenal Cut-Off		
Average Delay (sec/veh): 1.8 Worst Case Level Of Service: B		
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control:	Uncontrolled	Stop Sign
Rights:	Include	Include
Lanes:	0 1 0 0 0 0 1 0 1 0 0 0 0 1 0 0 0 1	1 0 0 0 1
Volume Module:		
Base Vol:	9 6 0 0 322 3 0 0 0 0	72 0 165
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	1.00 1.00 1.00
Initial Bse:	9 6 0 0 322 3 0 0 0 0	72 0 165
Added Vol:	5 2 0 0 81 0 0 0 0 0	0 0 18
PasserByVol:	0 0 0 0 0 0 0 0 0 0	0 0 0
Initial Fut:	14 8 0 0 403 3 0 0 0 0	72 0 183
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	1.00 1.00 1.00
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	0.90 0.90 0.90
PHF Volume:	16 9 0 0 448 3 0 0 0 0	80 0 203
Reduct Vol:	0 0 0 0 0 0 0 0 0 0	0 0 0
Final Vol:	16 9 0 0 448 3 0 0 0 0	80 0 203
Adjusted Volume Module:		
Grade:	0%	0%
% Cycle/Cars:	xxxx xxxx	xxxx xxxx
% Truck/Comb:	xxxx xxxx	xxxx xxxx
PCE Adj:	1.10 1.00 1.00 1.10 1.00 1.00 1.10 1.10 1.10 1.10	1.10 1.10 1.10
Cycl/Car PCE:	xxxx xxxx	xxxx xxxx
Trck/Comb PCE:	xxxx xxxx	xxxx xxxx
Adj Vol:	17 9 0 0 448 3 0 0 0 0	88 0 224
Critical Gap Module:		
MoveUp Time:	2.1 xxxx xxxx	3.4 xxxx 2.6
Critical Gp:	5.0 xxxx xxxx	6.5 xxxx 5.5
Capacity Module:		
Conflict Vol:	451 xxxx xxxx	472 xxxx 9
Potent Cap:	1045 xxxx xxxx	564 xxxx 1370
Adj Cap:	1.00 xxxx xxxx	0.98 xxxx 1.00
Move Cap:	1045 xxxx xxxx	555 xxxx 1370
Level Of Service Module:		
Stopped Del:	3.5 xxxx xxxx	7.6 xxxx 3.1
LOS by Move:	A *	B *
Movement:	LT - LTR - RT LT - LTR - RT LT - LTR - RT	LT - LTR - RT
Shared Cap:	xxxx xxxx xxxx	xxxx xxxx xxxx
Shrd StpDel:	xxxx xxxx xxxx	xxxx xxxx xxxx
Shared LOS:	2.3	4.4
ApproachDel:	2.3	0.0
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Table D-1

## Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

PM Existing + FA18	Fri Oct 17, 1997 17:07:19	Page 13-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM Unsignalized Method (Base Volume Alternative)		
Intersection #103 SR 198 EB Ramps & Avenal Cut-Off		
Average Delay (sec/veh): 2.3 Worst Case Level Of Service: B		
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control: Uncontrolled Uncontrolled Uncontrolled Uncontrolled	Stop Sign	Stop Sign
Rights: Ignore Ignore Ignore Ignore	Include	Include
Lanes: 1 0 1 0 1 1 0 1 0 1 0 1 0 1 0 0 1		
Volume Module:		
Base Vol:	197	1 6 7 76 300
Growth Adj:	1.00	1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse:	197	1 0 7 76 0 3 16 2 1 1 7
User Adj:	1.00	1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:	0.90	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90
PHF Volume:	219	1 0 8 84 0 3 18 2 1 1 8
Reduct Vol:	0	0 0 0 0 0 0 0 0 0 0
Final Vol:	219	1 0 8 84 0 3 18 2 1 1 8
Adjusted Volume Module:		
Grade:	0%	0% 0% 0% 0% 0% 0% 0% 0% 0%
% Cycle/Cars:	xxxx	xxxx
% Truck/Comb:	xxxx	xxxx
PCE Adj:	1.10	1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10
Cycl/Car PCE:	xxxx	xxxx
Trck/Cmb PCE:	xxxx	xxxx
Adj Vol:	241	1 0 9 84 0 4 20 2 1 1 9
Critical Gap Module:		
MoveUp Time:	2.1	xxxx
Critical Gp:	5.0	xxxx
Capacity Module:		
Conflict Vol:	84	xxxx
Potent Cap:	1563	xxxx
Adj Cap:	1.00	xxxx
Move Cap:	1563	xxxx
Level Of Service Module:		
Stopped Del:	2.7	xxxx
LOS by Move:	A	A
Movement:	LT - LTR - RT	LT - LTR - RT
Shared Cap:	xxxx	xxxx
Shrd StpDel:	xxxx	xxxx
Shared LOS:	*	*
ApproachDel:	2.7	0.2
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PM Existing + FA18	Fri Oct 17, 1997 17:07:19	Page 14-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM Unsignalized Method (Future Volume Alternative)		
Intersection #103 SR 198 EB Ramps & Avenal Cut-Off		
Average Delay (sec/veh): 2.2 Worst Case Level Of Service: B		
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control: Uncontrolled Uncontrolled Uncontrolled Uncontrolled	Stop Sign	Stop Sign
Rights: Ignore Ignore Ignore Ignore	Include	Include
Lanes: 1 0 1 0 1 1 0 1 0 1 0 1 0 1 0 0 1		
Volume Module:		
Base Vol:	197	1 6 7 76 300
Growth Adj:	1.00	1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse:	197	1 0 7 76 0 3 16 2 1 1 7
User Adj:	1.00	1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Adj:	0.90	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90
PHF Volume:	219	1 0 8 84 0 3 18 2 1 1 8
Reduct Vol:	0	0 0 0 0 0 0 0 0 0 0
Final Vol:	219	1 0 8 84 0 3 18 2 1 1 8
Adjusted Volume Module:		
Grade:	0%	0% 0% 0% 0% 0% 0% 0% 0% 0%
% Cycle/Cars:	xxxx	xxxx
% Truck/Comb:	xxxx	xxxx
PCE Adj:	1.10	1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.10
Cycl/Car PCE:	xxxx	xxxx
Trck/Cmb PCE:	xxxx	xxxx
Adj Vol:	241	1 0 9 84 0 4 20 2 1 1 9
Critical Gap Module:		
MoveUp Time:	2.1	xxxx
Critical Gp:	5.0	xxxx
Capacity Module:		
Conflict Vol:	94	xxxx
Potent Cap:	1546	xxxx
Adj Cap:	1.00	xxxx
Move Cap:	1546	xxxx
Level Of Service Module:		
Stopped Del:	2.7	xxxx
LOS by Move:	A	A
Movement:	LT - LTR - RT	LT - LTR - RT
Shared Cap:	xxxx	xxxx
Shrd StpDel:	xxxx	xxxx
Shared LOS:	*	*
ApproachDel:	2.6	0.2
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Table D-1

## Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

PM Existing + FA18		Fri Oct 17, 1997 17:07:19		Page 15-1					
Traffic Impact Analysis		Traffic Impact Analysis		Page 16-1					
F/A-18 E/F Squadron Siting		F/A-18 E/F Squadron Siting							
Level Of Service Computation Report									
1994 HCM Operations Method (Base Volume Alternative)									
Intersection #104 SR 41 & Grangeville									
*****									
Cycle (sec):	80	Critical Vol./Cap. (X):	0.494						
Loss Time (sec):	9 (Y+R = 9 sec)	Average Delay (sec/veh):	13.0						
Optimal Cycle:	77	Level Of Service:	B						
*****									
Approach:	North Bound	South Bound	East Bound	West Bound					
Movement:	L - T - R	L - T - R	L - T - R	L - T - R					
Control:	Protected	Protected	Protected	Protected					
Rights:	Include	Include	Include	Include					
Min. Green:	18 30 30	3 15 15	35 35 35	35 35 35					
Lanes:	1 0 2 0 1	1 0 2 0 1	0 1 0 0 1	0 1 0 0 1					
Volume Module:									
Base Vol:	109 254	21 18 198	33 166 191	31 35 101	16				
Growth Adj:	1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00				
Initial Bse:	109 254	21 18 198	33 166 191	31 35 101	16				
User Adj:	1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00				
PHF Adj:	0.90 0.90	0.90 0.90 0.90	0.90 0.90 0.90	0.90 0.90 0.90	0.90				
PHF Volume:	121 282	23 20 220	37 184 212	34 39 112	18				
Reduced Vol:	0 0 0	0 0 0	0 0 0	0 0 0	0				
PCE Adj:	1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00				
MLF Adj:	1.00 1.05	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00				
Final Vol:	121 296	23 20 231	37 184 212	34 39 112	18				
Saturation Flow Module:									
Sat/Lane:	1900 1900	1900 1900 1900	1900 1900 1900	1900 1900 1900	1900				
Adjustment:	0.93 0.98	0.83 0.68 0.68	0.83 0.66 0.66	0.83 0.66 0.66	0.83				
Lanes:	1.00 2.00	1.00 2.00 1.00	0.46 0.54 1.00	0.26 0.74 1.00	1.00				
Final Sat:	1770 3725	1583 1770 3725	1583 597 688	1583 322 926	1583				
Capacity Analysis Module:									
Vol/Sat:	0.07 0.08	0.01 0.01 0.06	0.02 0.31 0.31	0.02 0.12 0.12	0.01				
Crit Moves:	****	****	****	****	****				
Green/Cycle:	0.23 0.38	0.04 0.19	0.19 0.48 0.48	0.48 0.48 0.48	0.48				
Volume/Cap:	0.30 0.21	0.04 0.30 0.33	0.12 0.65 0.65	0.05 0.25 0.25	0.02				
Level Of Service Module:									
Delay/Veh:	16.8 11.0	10.2 25.0 18.3	17.5 12.0 12.0	7.3 8.2 8.2	7.2				
User DelAdj:	1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00 1.00 1.00	1.00				
AdjDel/Veh:	16.8 11.0	10.2 25.0 18.3	17.5 12.0 12.0	7.3 8.2 8.2	7.2				
Queue:	2 4	0 0 4	1 3 4	0 1 1	0				
*****									

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Table D-1

## Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

PM Existing + FA18	Fri Oct 17, 1997 17:07:19	Page 17-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM 4-Way Stop Method (Base Volume Alternative)		
Intersection #301 Evan Hewes & Drew		
Cycle (sec):	1	Critical Vol./Cap. (X): 0.355
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 3.0
Optimal Cycle:	0	Level Of Service: A
Approach:	North Bound South Bound East Bound West Bound	
Movement:	L - T - R L - T - R L - T - R L - T - R	
Control:	Stop Sign Stop Sign Stop Sign Stop Sign	
Rights:	Include Include Include Include	
Lanes:	0 0 1 0 0 0 0 1 0 0 0 1 0 0 0 1 0 0	
Volume Module:		
Base Vol:	17 30 20 18 19 20 21 131 133 15 43 16	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	17 30 20 18 19 20 21 131 133 15 43 16	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	19 33 22 20 21 22 23 146 148 17 48 18	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0	
Reduced Vol:	19 33 22 20 21 22 23 146 148 17 48 18	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
M/F Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	19 33 22 20 21 22 23 146 148 17 48 18	
Saturation Flow Module:		
Sat/Lane:	391 393 393 446 446 446 425 425 425	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.26 0.44 0.30 0.32 0.33 0.35 0.15 0.92 0.93 0.41 1.16 0.43	
Final Sat:	100 174 116 125 131 137 65 411 416 174 492 184	
Capacity Analysis Module:		
Vol/Sat:	0.19 0.19 0.19 0.16 0.16 0.16 0.36 0.36 0.10 0.10 0.10	
Crit Moves:	****	
ApproachV/S:	0.19 0.16 0.36	
Level Of Service Module:		
Delay/Veh:	2.1 2.1 2.1 1.8 1.8 1.8 3.9 3.9 1.4 1.4 1.4	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	2.1 2.1 2.1 1.8 1.8 1.8 3.9 3.9 1.4 1.4 1.4	
LOS by Move:	A A A A A A A A A A A	
ApproachDel:	2.1 1.8 1.8 3.9	
LOS by Appr:	A A A A	
*****	*****	*****

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PM Existing + FA18	Fri Oct 17, 1997 17:07:19	Page 18-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM 4-Way Stop Method (Future Volume Alternative)		
Intersection #301 Evan Hewes & Drew		
Cycle (sec):	1	Critical Vol./Cap. (X): 0.398
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 3.9
Optimal Cycle:	0	Level Of Service: A
Approach:	North Bound South Bound East Bound West Bound	
Movement:	L - T - R L - T - R L - T - R L - T - R	
Control:	Stop Sign Stop Sign Stop Sign Stop Sign	
Rights:	Include Include Include Include	
Lanes:	0 0 1 0 0 0 0 1 0 0 0 1 0 0 0 1 0 0	
Volume Module:		
Base Vol:	17 30 20 18 19 20 21 131 133 15 43 16	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	17 30 20 18 19 20 21 131 133 15 43 16	
User Adj:	0 0 0 0 0 0 0 0 0 0 0	
PHF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Volume:	19 33 33 31 21 22 23 180 148 61 182 62	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0	
Reduced Vol:	19 33 33 31 21 22 23 180 148 61 182 62	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
M/F Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	19 33 33 31 21 22 23 180 148 61 182 62	
Saturation Flow Module:		
Sat/Lane:	260 260 334 334 441 441 441 475 475	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.22 0.39 0.39 0.42 0.28 0.30 0.13 1.03 0.84 0.40 1.19 0.41	
Final Sat:	58 101 101 140 95 99 58 452 372 190 567 193	
Capacity Analysis Module:		
Vol/Sat:	0.33 0.33 0.33 0.22 0.22 0.22 0.40 0.40 0.40 0.32 0.32 0.32	
Crit Moves:	****	
ApproachV/S:	0.33 0.22	
Level Of Service Module:		
Delay/Veh:	3.5 3.5 3.5 2.3 2.3 2.3 4.5 4.5 4.5 3.4 3.4	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	3.5 3.5 3.5 2.3 2.3 2.3 4.5 4.5 4.5 3.4 3.4	
LOS by Move:	A A A A A A A A A A A	
ApproachDel:	3.5 2.3 2.3 4.5	
LOS by Appr:	A A A A	
*****	*****	*****

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Table D-1

## Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

PM Existing + FA18	Fri Oct 17, 1997 17:07:19	Page 19-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report 1994 HCM 4-Way Stop Method (Base Volume Alternative)		
Intersection #302 Evan Hewes & Bennett		
Cycle (sec):	1	Critical Vol./Cap. (X): 0.527
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 2.8
Optimal Cycle:	0	Level Of Service: A
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control:	Stop Sign	Stop Sign
Rights:	Include	Include
Lanes:	0 0 1 0 0 0 1 0 0 1 1 0 0 0 1 0 0 0 1	0 1 0 0 1 0 0 0 1 0 0 0 1
Volume Module:		
Base Vol:	1 1 116 32 22 7 146 3 1 95 34	1 1 116 32 22 7 146 3 1 95 34
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Initial Bse:	1 1 116 32 22 7 146 3 1 95 34	1 1 116 32 22 7 146 3 1 95 34
Added Vol:	0 69 0 873 269 201 52 0 0 0 226	0 69 0 873 269 201 52 0 0 0 226
PasserByVol:	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0
Initial Fut:	1 70 1 989 301 223 59 146 3 1 95 260	1 70 1 989 301 223 59 146 3 1 95 260
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
PHF Vol:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Final Vol:	1 78 1 1099 334 248 66 162 3 1 106 289	1 78 1 1099 334 248 66 162 3 1 106 289
Saturation Flow Module:		
Sat/Lane:	468 468 567 567 567 206 206 103 103 103	468 468 567 567 567 206 206 103 103 103
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Lanes:	0.01 0.98 0.01 0.77 0.23 1.00 1.00 0.98 0.02 0.01 0.99	0.01 0.98 0.01 0.77 0.23 1.00 1.00 0.98 0.02 0.01 0.99
Final Sat:	6 456 6 435 132 567 206 202 4 1 102 103	6 456 6 435 132 567 206 202 4 1 102 103
Capacity Analysis Module:		
Vol/Sat:	0.17 0.17 0.17 2.53 2.53 0.44 0.32 0.80 0.80 1.04 1.04	0.17 0.17 0.17 2.53 2.53 0.44 0.32 0.80 0.80 1.04 1.04
Crit Moves:	0.17 ****	0.17 ****
ApproachV/S:	0.17 1.48	0.17 1.92
Level Of Service Module:		
Delay/Veh:	1.9 1.9 1.9 14822 xxxx 5.3 3.4 21.0 21.0 51.8 51.8	1.9 1.9 1.9 14822 xxxx 5.3 3.4 21.0 21.0 51.8 51.8
AdjDel/Veh:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
ApproachDel:	1.9 1.9 1.9 14822 xxxx 5.3 3.4 21.0 21.0 51.8 51.8	1.9 1.9 1.9 14822 xxxx 5.3 3.4 21.0 21.0 51.8 51.8
LOS by Move:	A A A F F B A D D F F F	A A A F F B A D D F F F
ApproachDel:	1.9 279.5	1.9 1487.5
LOS by Appr:	A F	F

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Table D-1

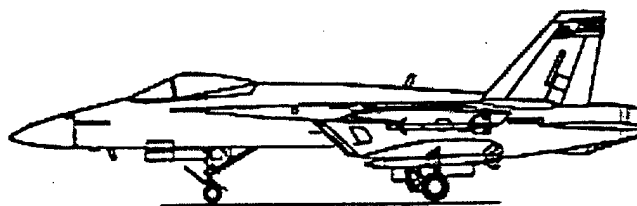
## Traffic Impact Analysis: Existing AM and PM + F/A-18E/F Traffic (continued)

PM Existing + FA18	Fri Oct 17, 1997 17:07:19	Page 21-1
Traffic Impact Analysis		
F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM 4-Way Stop Method (Base Volume Alternative)		
Intersection #303 Evan Hewes & Forrester		
Cycle (sec):	1	Critical Vol./Cap. (X): 0.727
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 4.9
Optimal Cycle:	0	Level Of Service: A
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control:	Stop Sign	Stop Sign
Rights:	Include	Include
Lanes:	0 0 1 0 0 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0	
Volume Module:		
Base Vol:	19 90 14 31 151 15 51 193 31 17 115 19	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	19 90 14 31 151 15 51 193 31 17 115 19	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	21 100 16 34 168 17 57 214 34 19 128 21	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	21 100 16 34 168 17 57 214 34 19 128 21	
Saturation Flow Module:		
Sat/Lane:	405 443 443 341 341 405 304 304 304	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.15 0.73 0.12 0.15 0.77 0.08 1.00 0.86 0.14 1.00 0.86 0.14	
Final Sat:	62 296 47 69 340 34 341 294 47 304 261 43	
Capacity Analysis Module:		
Vol/Sat:	0.34 0.34 0.34 0.49 0.49 0.49 0.17 0.73 0.73 0.06 0.49 0.49	
Crit Moves:	****	****
ApproachV/S:	0.34 0.49 0.45	0.28
Level Of Service Module:		
Delay/Veh:	3.6 3.6 3.6 6.5 6.5 6.5 1.9 15.9 15.9 1.3 6.4 6.4	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	3.6 3.6 3.6 6.5 6.5 6.5 1.9 15.9 15.9 1.3 6.4 6.4	
LOS by Move:	A A A B B B A C C A B B	
ApproachDel:	3.6 6.5 6.5 5.5 5.5 2.9	
LOS by Appr:	A B B B B A	
*****		

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PM Existing + FA18	Fri Oct 17, 1997 17:07:19	Page 22-1
Traffic Impact Analysis		
F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM 4-Way Stop Method (Future Volume Alternative)		
Intersection #303 Evan Hewes & Forrester		
Cycle (sec):	1	Critical Vol./Cap. (X): 2.195
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 136.6
Optimal Cycle:	0	Level Of Service: F
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control:	Stop Sign	Stop Sign
Rights:	Include	Include
Lanes:	0 0 1 0 0 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0	
Volume Module:		
Base Vol:	19 90 14 31 151 15 51 193 31 17 115 19	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	19 90 14 31 151 15 51 193 31 17 115 19	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	48 100 16 34 168 17 57 214 34 19 128 21	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	48 100 16 34 168 17 57 214 34 19 128 21	
Saturation Flow Module:		
Sat/Lane:	262 262 262 198 198 262 198 198 198	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.29 0.61 0.10 0.13 0.62 0.25 1.00 0.86 0.14 1.00 0.93 0.07	
Final Sat:	77 160 26 25 124 49 467 404 63 382 357 25	
Capacity Analysis Module:		
Vol/Sat:	0.63 0.63 0.63 1.36 1.36 1.36 0.54 2.19 2.19	
Crit Moves:	****	****
ApproachV/S:	0.63 1.36 1.37	0.45
Level Of Service Module:		
Delay/Veh:	10.8 10.8 10.8 174.6 175 174.6 7.7 4190 4190	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	10.8 10.8 10.8 174.6 175 174.6 7.7 4190 4190	
LOS by Move:	C C C F F F B F F A D D	
ApproachDel:	10.8 174.6 179.7 5.5	
LOS by Appr:	C C F F F B	
*****		

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AM AND PM CUMULATIVE PLUS F/A-18E/F TRAFFIC

Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic

AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 1-1
Traffic Impact Analysis		
F/A-18 E/F Squadron Siting		
Scenario Report		
Scenario:	AM Cum + FA18 Project	
Command:	Default	
Volume:	AM Cum Base FA18	
Geometry:	AM Existing	
Impact Fee:	Default Impact Fee	
Trip Generation:	AM FA-18	
Trip Distribution:	E2 Default	
Paths:	Default Paths	
Routes:	Default Routes	
Configuration:	Default Configuration	

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

AM Cum + FA18 Project		Mon Oct 20, 1997 09:47:42		Page 2-1		AM Cum + FA18 Project		Mon Oct 20, 1997 09:47:42		Page 3-1							
		Traffic Impact Analysis F/A-18 E/F Squadron Siting						Traffic Impact Analysis F/A-18 E/F Squadron Siting									
		Trip Generation Report						Trip Generation Report									
		Forecast for AM Personnel On-Base						Forecast for AM Spouses/Dependants On-Base									
Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total % Of Trips	Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total % Of Trips
101	Lemoore Oper	433.00	FA 18 Personnel	0.02	0.02	9	9	18 0.7	101	Lemoore Oper	178.00	FA 18 Spouse	0	0.30	0	53	53 2.1
	Zone 101 Subtotal					9	9	18 0.7		Zone 101 Subtotal					0	53	53 2.1
102	Lemoore Hous	111.00	FA 18 Personnel	0.02	0.02	2	2	4 0.2	102	Lemoore Hous	46.00	FA 18 Spouse	0	0.30	0	14	14 0.6
	Zone 102 Subtotal					2	2	4 0.2		Zone 102 Subtotal					0	14	14 0.6
103	Lemoore Main	464.00	FA 18 Personnel	0.02	0.02	9	9	18 0.7	103	Lemoore Main	191.00	FA 18 Spouse	0	0.30	0	57	57 2.3
	Zone 103 Subtotal					9	9	18 0.7		Zone 103 Subtotal					0	57	57 2.3
307	NAF El Centr	1890.00	FA 18 Personnel	0.02	0.02	38	38	76 3.0	307	NAF El Centr	778.00	FA 18 Spouses	0.00	0.30	0	233	233 9.3
	Zone 307 Subtotal					38	38	76 3.0		Zone 307 Subtotal					0	233	233 9.3
TOTAL						58	58	116 4.6	TOTAL						0	357	357 14.3

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

AM Cum + FA18 Project				Mon Oct 20, 1997 09:47:42				Page 7-2				Page 7-3					
				Traffic Impact Analysis				F/A-18 E/F Squadron Siting				Traffic Impact Analysis					
				F/A-18 E/F Squadron Siting				F/A-18 E/F Squadron Siting				F/A-18 E/F Squadron Siting					
Volume	Northbound	Southbound	Eastbound	Westbound	Total	Volume	Northbound	Southbound	Eastbound	Westbound	Total	Volume	Northbound	Southbound	Eastbound	Westbound	Total
Type	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right Volume	Type	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right Volume	Type	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right Volume
<b>#201 Navalair &amp; SR 1 SB Ramps</b>																	
Base	0	52	2	2	26	0	0	0	0	0	138	0	138	0	1	221	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	52	2	2	26	0	0	0	0	0	138	0	138	0	1	221	0
<b>#202 Navalair &amp; Wood</b>																	
Base	0	50	105	7	157	0	0	0	0	0	42	0	42	0	6	367	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	50	105	7	157	0	0	0	0	0	42	0	42	0	6	367	0
<b>#203 N. Mugu &amp; Frontage</b>																	
Base	43	34	0	0	54	360	123	0	15	0	0	0	0	0	0	629	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	43	34	0	0	54	360	123	0	15	0	0	0	0	0	0	629	0
<b>#204 Main &amp; Frontage</b>																	
Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>#205 Las Posas &amp; SR 1 NB Off Ramp</b>																	
Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>#301 Evan Hewes &amp; Drew</b>																	
Base	123	14	31	22	22	7	7	61	39	24	107	7	464	0	0	0	0
Added	0	0	39	39	0	0	0	117	0	9	28	9	241	0	0	0	0
Total	123	14	70	61	22	7	7	178	39	33	135	16	705	0	0	0	0
<b>#302 Evan Hewes &amp; Bennett</b>																	
Base	0	84	0	45	16	16	60	90	1	0	131	272	715	0	0	0	0
Added	0	261	0	201	62	46	196	0	0	0	0	848	1614	0	0	0	0
Total	0	345	0	246	78	62	256	90	1	0	131	1120	2329	0	0	0	0
<b>#303 Evan Hewes &amp; Forrester</b>																	
Base	35	65	11	30	107	76	26	170	19	104	239	12	894	0	0	0	0
Added	91	0	0	0	0	170	40	139	22	0	587	0	1049	0	0	0	0
Total	126	65	11	30	107	246	66	309	41	104	826	12	1943	0	0	0	0
<b>#401 Alameda &amp; First</b>																	
Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>#402 Alameda &amp; Third</b>																	
Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

AM Cum + FA18 Project		Mon Oct 20, 1997 09:47:42		Page 8-1		Page 9-1	
Traffic Impact Analysis		Traffic Impact Analysis		F/A-18 E/F Squadron Siting		F/A-18 E/F Squadron Siting	
Impact Analysis Report		Level Of Service		Level Of Service		Level Of Service	
Intersection		Base Del/V/ LOS Veh C		Future Del/V/ LOS Veh C		Change in	
#101 Jackson & Main Gate		B 6.7 0.162		E 47.8 1.000		+41.057 D/V	
#102 SR 198 WB Ramps & Avenal Cut-O		B 2.9 0.000		B 3.2 0.000		+ 0.000 V/C	
#103 SR 198 EB Ramps & Avenal Cut-O		B 1.0 0.000		B 1.0 0.000		+ 0.000 V/C	
#104 SR 41 & Grangeville		B 14.4 0.550		C 22.3 0.881		+ 7.844 D/V	
#301 Evan Hewes & Drew		A 3.4 0.411		B 8.3 0.755		+ 0.344 V/C	
#302 Evan Hewes & Bennett		B 7.1 0.816		F OVREFL 4.557		+ 3.741 V/C	
#303 Evan Hewes & Forrester		B 9.0 0.792		F OVREFL 2.530		+ 1.738 V/C	

AM Cum + FA18 Project		Mon Oct 20, 1997 09:47:42		Page 9-1	
Traffic Impact Analysis		Traffic Impact Analysis		F/A-18 E/F Squadron Siting	
Level Of Service Computation Report		Level Of Service Computation Report		Level Of Service Computation Report	
Intersection #101 Jackson & Main Gate		Intersection #101 Jackson & Main Gate		Intersection #101 Jackson & Main Gate	
Cycle (sec):		80		Critical Vol./Cap. (X):	
Loss Time (sec):		12 (Y+R = 3 sec)		Average Delay (sec/veh):	
Optimal Cycle:		77		Level Of Service:	
Approach:		North Bound		South Bound	
Movement:		L - T - R		L - T - R	
Control:		Split Phase		Split Phase	
Rights:		Include		Include	
Min. Green:		3 3 3		3 53 53	
Lanes:		0 1 0 0 1		1 0 1 0 1	
Volume Module:		2 6 4		8 72 2	
Base Vol:		1.00 1.00 1.00		1.00 1.00 1.00	
Growth Adj:		2 6 4		8 72 2	
Initial Bse:		1.00 1.00 1.00		1.00 1.00 1.00	
User Adj:		0.90 0.90 0.90		0.90 0.90 0.90	
PHF Adj:		2 7 4		9 80 2	
PHF Volume:		0 0 0		0 0 0	
Reduced Vol:		2 7 4		9 80 2	
PCE Adj:		1.00 1.00 1.00		1.00 1.00 1.00	
MLF Adj:		1.00 1.00 1.00		1.00 1.00 1.00	
Final Vol.:		2 7 4		9 80 2	
Saturation Flow Module:		1900 1900 1900		1900 1900 1900	
Sat/Lane:		0.97 0.97 0.83		0.93 0.93 0.98	
Adjustment:		0.22 0.78 1.00		1.00 1.00 1.00	
Lanes:		410 1434 1583		1770 1500 1928	
Final Sat.:		1770 1500 1928		1770 1583 1583	
Capacity Analysis Module:		Vol/Sat: 0.00 0.00 0.00		0.04 0.00 0.00	
Vol/Sat:		0.00 0.00 0.00		0.01 0.04 0.00	
Crit Moves:		0.04 0.04 0.04		0.04 0.66 0.66	
Green/Cycle:		0.13 0.13 0.07		0.05 0.14 0.06	
Volume/Cap:		0.04 0.04 0.04		0.00 0.10 0.13	
Level Of Service Module:		Delay/Veh: 24.1 24.1 24.0		21.6 24.1 3.1	
Delay/Veh:		24.1 24.1 24.0		21.6 24.1 3.1	
User DelAdj:		1.00 1.00 1.00		1.00 1.00 1.00	
AdjDel/Veh:		24.1 24.1 24.0		21.6 24.1 3.1	
Queue:		0 0 0		0 0 0	

Table D-2

## Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 10-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM Operations Method (Future Volume Alternative)		
Intersection #101 Jackson & Main Gate		
Cycle (sec):	80	Critical Vol./Cap. (X): 1.000
Loss Time (sec):	12 (Y+R = 3 sec)	Average Delay (sec/veh): 47.8
Optimal Cycle:	152	Level Of Service: E
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control:	Split Phase	Protected
Rights:	Include	Protected
Min. Green:	3 3 3 3 4 4 4 4	5 5 5 5
Lanes:	0 1 0 0 1 1 0 0 1 1	1 0 1 0 1 0 1 1
Volume Module:		
Base Vol:	2 6 4 61 6 8 72 2	10 150 865
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	1.00 1.00 1.00
Initial Bse:	2 6 4 61 6 8 72 2	10 150 865
Added Vol:	0 0 0 0 2 7 0 0	0 0 0 0 326
PasserByVol:	0 0 0 0 0 0 0 0	0 0 0 0 0
Initial Fut:	2 6 4 135 6 10 15 72	2 10 150 1191
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	1.00 1.00 1.00
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	0.90 0.90 0.90
PHF Volume:	2 7 4 150 7 11 17 80	2 11 167 1323
Reduced Vol:	0 0 0 0 0 0 0 0	0 0 0 0 0
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	1.00 1.00 1.00
MLF Adj:	1.00 1.00 1.00 1.00 1.05 1.00 1.00 1.00	1.00 1.00 1.00
Final Vol:	2 7 4 150 7 12 17 80	2 11 167 1323
Saturation Flow Module:		
Sat/Lane:	1900 1900 1900 1900 1900 1900 1900 1900	1900 1900 1900
Adjustment:	0.97 0.97 0.83 0.93 0.89 0.89 0.93 0.98	0.83 0.93 0.98 0.83
Lanes:	0.22 0.78 1.00 1.00 0.74 1.26 1.00 1.00	1.00 1.00 1.00
Final Sat:	410 1434 1583 1770 1249 2141 1770 1863	1583 1770 1863 1583
Capacity Analysis Module:		
Vol/Sat:	0.00 0.00 0.00 0.08 0.01 0.01 0.01 0.04	0.00 0.01 0.09 0.84
Crit Moves:	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00
Green/Cycle:	0.04 0.04 0.04 0.08 0.08 0.08 0.04 0.67	0.67 0.06 0.70 0.77
Volume/Cap:	0.13 0.13 0.07 1.08 0.07 0.07 0.26 0.06	0.00 0.10 0.13 1.08
Level Of Service Module:		
Delay/Veh:	24.1 24.1 24.0 112.1 22.1 22.1 24.6 2.9	2.8 22.8 2.6 50.1
User DelAdj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	1.00 1.00 1.00 1.00
AdjDel/Veh:	24.1 24.1 24.0 112.1 22.1 22.1 24.6 2.9	2.8 22.8 2.6 50.1
Queue:	0 0 0 8 0 0 0 1	0 0 0 1 60

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AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 11-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM Unsignalized Method (Base Volume Alternative)		
Intersection #102 SR 198 WB Ramps & Avenal Cut-Off		
Average Delay (sec/veh):	2.9	Worst Case Level Of Service: B
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control:	Uncontrolled	Stop Sign
Rights:	Ignore	Include
Lanes:	0 1 0 0 0 0 1 0 1 0 0 0 0 0 1 0 0 0 1	1 0 0 0 1
Volume Module:		
Base Vol:	15 15 0 0 168 2 0 0 0 0 109 0 321	
Growth Adj:	1.00 1.00 0.00 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	15 15 0 0 168 0 0 0 0 0 109 0 321	
User Adj:	1.00 1.00 0.00 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.00 0.90 0.90 0.00 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	17 17 0 0 187 0 0 0 0 0 121 0 357	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0 0	
Final Vol:	17 17 0 0 187 0 0 0 0 0 121 0 357	
Adjusted Volume Module:		
Grade:	0%	0%
% Cycle/Cars:	xxxx xxxx	xxxx xxxx
% Truck/Comb:	xxxx xxxx	xxxx xxxx
PCE Adj:	1.10 1.00 1.00 1.10 1.00 1.00 1.10 1.10 1.10 1.10 1.10 1.10 1.10	
Cycl/Car PCE:	xxxx xxxx	xxxx xxxx
Trct/Comb PCE:	xxxx xxxx	xxxx xxxx
Adj Vol:	18 17 0 0 187 0 0 0 0 0 133 0 392	
Critical Gap Module:		
MoveUp Time:	2.1 xxxx	xxxx xxxx
Critical Cp:	5.0 xxxx	xxxx xxxx
Capacity Module:		
Conflict Vol:	187 xxxx	xxxx xxxx
Potent Cap:	1397 xxxx	xxxx xxxx
Adj Cap:	1.00 xxxx	xxxx xxxx
Move Cap:	1397 xxxx	xxxx xxxx
Level Of Service Module:		
Stopped Del:	2.6 xxxx	xxxx xxxx
LOS by Move:	A *	*
Movement:	LT - LTR - RT LT - LTR - RT LT - LTR - RT LT - LTR - RT	RT LT - LTR - RT
Shared Cap:	xxxx xxxx	xxxx xxxx
Shrd StpDel:	xxxx xxxx	xxxx xxxx
Shared LOS:	*	*
ApproachDel:	1.4	0.0

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 12-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM Unsignalized Method (Future Volume Alternative)		
Intersection #102 SR 198 WB Ramps & Avenal Cut-Off		
Average Delay (sec/veh): 3.2 Worst Case Level Of Service: B		
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control: Uncontrolled	Stop Sign	Stop Sign
Rights: Ignore	Include	Include
Lanes: 0 1 0 0 0 0 1 0 0 0 0 1 0 0 0 1		
Volume Module:		
Base Vol: 15 15 0 0 168 2 0 0 0 0 109 0 321		
Growth Adj: 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00		
Initial Bse: 15 15 0 0 168 0 0 0 0 109 0 321		
Added Vol: 20 9 0 0 18 0 0 0 0 0 0 0 70		
PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0 0		
Initial Fut: 35 24 0 0 186 0 0 0 0 109 0 391		
User Adj: 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00		
PHF Adj: 0.90 0.90 0.00 0.90 0.90 0.90 0.90 0.90 0.90		
PHF Volume: 39 27 0 0 207 0 0 0 0 121 0 434		
Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0		
Final Vol: 39 27 0 0 207 0 0 0 0 121 0 434		
Adjusted Volume Module:		
Grade: 0%	0%	0%
% Cycle/Cars: xxxx xxxx xxxx xxxx 0%	xxxx xxxx	xxxx xxxx
% Truck/Comb: xxxx xxxx xxxx xxxx 0%	xxxx xxxx	xxxx xxxx
PCE Adj: 1.10 1.00 1.00 1.10 1.00 1.10 1.10 1.10 1.10		
Cycl/Car PCE: xxxx xxxx xxxx xxxx 1.10 1.10 1.10		
Trck/Comb PCE: xxxx xxxx xxxx xxxx 1.10 1.10 1.10		
Adj Vol: 43 27 0 0 207 0 0 0 0 133 0 478		
Critical Gap Module:		
MoveUp Time: 2.1 xxxx xxxx xxxx xxxx 3.4 xxxx 2.6		
Critical Gp: 5.0 xxxx xxxx xxxx xxxx 6.5 xxxx 5.5		
Capacity Module:		
Conflict Vol: 207 xxxx xxxx xxxx xxxx 272 xxxx 27		
Potent Cap: 1366 xxxx xxxx xxxx xxxx 737 xxxx 1342		
Adj Cap: 1.00 xxxx xxxx xxxx xxxx 0.97 xxxx 1.00		
Move Cap: 1366 xxxx xxxx xxxx xxxx 713 xxxx 1342		
Level Of Service Module:		
Stopped Del: 2.7 xxxx xxxx xxxx xxxx 6.1 xxxx 4.0		
LOS by Move: A * * * * * B * A		
Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT		
Shared Cap: xxxx xxxx xxxx xxxx xxxx xxxx xxxx		
Shrd StpDel: xxxx xxxx xxxx xxxx xxxx xxxx xxxx		
Shared LOS: * * * * * * * * * *		
ApproachDel: 1.7 0.0 0.0 4.4		

AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 13-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM Unsignalized Method (Base Volume Alternative)		
Intersection #103 SR 198 EB Ramps & Avenal Cut-Off		
Average Delay (sec/veh): 1.0 Worst Case Level Of Service: B		
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control: Uncontrolled	Uncontrolled	Stop Sign
Rights: Ignore	Ignore	Include
Lanes: 1 0 1 0 1 1 0 1 0 1 0 1 0 1 0 1		
Volume Module:		
Base Vol: 57 8 3 3 261 59 1 5 2 6 4 25		
Growth Adj: 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00		
Initial Bse: 57 8 0 3 261 0 1 5 2 6 4 25		
User Adj: 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00		
PHF Adj: 0.90 0.90 0.00 0.90 0.90 0.90 0.90 0.90 0.90		
PHF Volume: 63 9 0 3 290 0 1 6 2 7 4 28		
Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0		
Final Vol: 63 9 0 3 290 0 1 6 2 7 4 28		
Adjusted Volume Module:		
Grade: 0%	0%	0%
% Cycle/Cars: xxxx xxxx xxxx xxxx 0%	xxxx xxxx	xxxx xxxx
% Truck/Comb: xxxx xxxx xxxx xxxx 0%	xxxx xxxx	xxxx xxxx
PCE Adj: 1.10 1.00 1.00 1.10 1.00 1.10 1.10 1.10 1.10		
Cycl/Car PCE: xxxx xxxx xxxx xxxx 1.10 1.10 1.10		
Trck/Comb PCE: xxxx xxxx xxxx xxxx 1.10 1.10 1.10		
Adj Vol: 70 9 0 4 290 0 1 6 2 7 5 31		
Critical Gap Module:		
MoveUp Time: 2.1 xxxx xxxx 2.1 xxxx 3.4 3.3 2.6 3.4 3.3 2.6		
Critical Gp: 5.0 xxxx xxxx 5.0 xxxx 6.5 6.0 5.5 6.5 6.0 5.5		
Capacity Module:		
Conflict Vol: 290 xxxx xxxx 9 xxxx 382 366 290 369 366 9		
Potent Cap: 1247 xxxx xxxx 1698 xxxx 637 701 987 647 701 1370		
Adj Cap: 1.00 xxxx xxxx 1.00 xxxx 0.93 0.94 1.00 0.95 0.94 1.00		
Move Cap: 1247 xxxx xxxx 1698 xxxx 591 661 987 613 661 1370		
Level Of Service Module:		
Stopped Del: 3.0 xxxx xxxx 2.1 xxxx 6.1 5.5 3.7 5.9 5.5 2.7		
LOS by Move: A * * * * * B * A		
Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT		
Shared Cap: xxxx xxxx xxxx xxxx xxxx xxxx 631 xxxx 631 xxxx		
Shrd StpDel: xxxx xxxx xxxx xxxx xxxx xxxx 5.6 xxxx 5.8 xxxx		
Shared LOS: * * * * * * * * * *		
ApproachDel: 2.7 0.0 5.1 3.6		

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 14-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report 1994 HCM Unsignalized Method (Future Volume Alternative)		
Intersection #103 SR 198 EB Ramps & Avenal Cut-Off		
Average Delay (sec/veh): 1.0 Worst Case Level Of Service: B		
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control: Uncontrolled Uncontrolled Stop Sign Stop Sign		
Rights: Ignore Ignore Include Include		
Lanes: 1 0 1 0 1 1 0 1 0 1 0 1 0 1 0 1		
Volume Module:		
Base Vol:	57 8 3 3 261 59 1 5 2 6 4 25	
Growth Adj:	1.00 1.00 0.00 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	57 8 3 3 261 59 1 5 2 6 4 25	
Added Vol:	0 29 0 0 2 16 0 0 0 0 0 0	
PasserByVol:	0 0 0 0 0 0 0 0 0 0 0 0	
Initial Fut:	57 37 0 3 263 0 1 5 7 6 4 25	
User Adj:	1.00 1.00 0.00 1.00 1.00 0.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.00 0.90 0.90 0.00 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	63 41 0 3 292 0 1 6 8 7 4 28	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
Final Vol:	63 41 0 3 292 0 1 6 8 7 4 28	
Adjusted Volume Module:		
Grade:	0%	0%
% Cycle/Cars:	xxxx xxxx	xxxx xxxx
% Truck/Comb:	xxxx xxxx	xxxx xxxx
PCE Adj:	1.10 1.00 1.00 1.10 1.00 1.00 1.10 1.10 1.10 1.10 1.10 1.10	
Cycl/Car PCE:	xxxx xxxx	xxxx xxxx
Trck/Comb PCE:	xxxx xxxx	xxxx xxxx
Adj Vol:	70 41 0 4 292 0 1 6 9 7 5 31	
Critical Gap Module:		
Moveup Time:	2.1 xxxx xxxx	3.4 3.3 2.6 3.4 3.3 2.6
Critical Gp:	5.0 xxxx xxxx	5.0 6.0 5.5 6.5 6.0 5.5
Capacity Module:		
Conflict Vol:	292 xxxx xxxx	416 400 292 407 400 41
Potent Cap:	1244 xxxx xxxx	608 673 985 616 673 1320
Adj Cap:	1.00 xxxx xxxx	0.93 0.94 1.00 0.94 0.94 1.00
Move Cap:	1244 xxxx xxxx	564 634 985 579 634 1320
Level Of Service Module:		
Stopped Del:	3.0 xxxx xxxx	6.4 5.7 3.7 6.3 5.7 2.8
LOS by Move:	A +	A +
Movement:	LT - LTR - RT	LT - LTR - RT
Shared Cap:	xxxx xxxx xxxx	621 xxxx xxxx 600 xxxx xxxx
Shrd StpDel:	xxxx xxxx xxxx	5.9 xxxx xxxx 6.1 xxxx xxxx
Shared LOS:	+ + + + +	+ + + + +
ApproachDel:	1.9	0.0 4.7 3.7

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AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 15-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report 1994 HCM Operations Method (Base Volume Alternative)		
Intersection #104 SR 41 & Grangeville		
Cycle (sec): 80 Critical Vol./Cap. (X): 0.550		
Loss time (sec): 9 (V+R = 9 sec) Average Delay (sec/veh): 14.4		
Optimal Cycle: 36 Level Of Service: B		
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control: Protected Protected Protected Protected		
Rights: Include Include Include Include		
Lanes: 1 0 2 0 1 1 0 2 0 1 0 1 0 0 1 0 0 1		
Volume Module:		
Base Vol:	302 239 17 9 284 82 66 47 20 24 316 14	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	302 239 17 9 284 82 66 47 20 24 316 14	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	336 266 19 10 316 91 73 52 22 27 351 16	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
Final Vol:	336 266 19 10 316 91 73 52 22 27 351 16	
Saturation Flow Module:		
Sat/Lane:	1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900	
Adjustment:	0.93 0.98 0.83 0.93 0.98 0.83 0.35 0.35 0.83 0.35 0.95 0.83	
Lanes:	1.00 2.00 1.00 1.00 2.00 1.00 0.58 0.42 1.00 0.07 0.93 1.00	
Final Sat:	1770 3725 1583 1770 3725 1583 392 279 1583 129 1678 1583	
Capacity Analysis Module:		
Vol/Sat:	0.19 0.07 0.01 0.01 0.09 0.06 0.19 0.19 0.01 0.21 0.21 0.01	
Crit Moves:	****	****
Green/Cycle:	0.35 0.47 0.47 0.04 0.16 0.16 0.38 0.38 0.38 0.38 0.38 0.38	
Volume/Cap:	0.55 0.16 0.03 0.16 0.55 0.36 0.49 0.49 0.04 0.55 0.55 0.03	
Level Of Service Module:		
Delay/Veh:	14.5 7.8 7.3 24.3 20.8 19.6 13.4 13.4 10.1 13.3 13.3 10.0	
User DelAdj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	14.5 7.8 7.3 24.3 20.8 19.6 13.4 13.4 10.1 13.3 13.3 10.0	
Queue:	6 4 0 0 7 2 1 1 0 1 6 0	
*****		

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 16-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report 1994 HCM Operations Method (Future Volume Alternative)		
Intersection #104 SR 41 & Grangeville		
Cycle (sec): 80	Critical Vol./Cap. (X): 0.881	
Loss Time (sec): 9 (Y+R = 9 sec)	Average Delay (sec/veh): 22.3	
Optimal Cycle: 85	Level Of Service: C	
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control: Protected Protected Protected Protected Permitted Permitted		
Rights: Include Include Include Include Include Include		
Min. Green: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
Lanes: 1 0 2 0 1 1 0 2 0 1 0 1 0 0 1 0 1 0 0 1		
Volume Module:		
Base Vol: 302 239 17 9 284 82 66 47 20 24 316 14		
Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
Initial Bse: 302 239 17 9 284 82 66 47 20 24 316 14		
Added Vol: 94 0 0 0 72 17 34 22 0 147 0 0		
PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0		
Initial Fut: 396 239 17 9 284 154 83 81 42 24 463 14		
User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
PHF Adj: 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90		
PHF Volume: 440 266 19 10 316 171 92 90 47 27 514 16		
Reduced Vol: 0 0 0 0 0 0 0 0 0 0 0 0		
Reduced Vol: 440 266 19 10 316 171 92 90 47 27 514 16		
PCE Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
MLF Adj: 1.00 1.05 1.00 1.00 1.00 1.05 1.00 1.00 1.00 1.00 1.00 1.00		
Final Vol: 440 279 19 10 331 171 92 90 47 27 514 16		
Saturation Flow Module:		
Sat/Lane: 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900		
Adjustment: 0.93 0.98 0.83 0.93 0.98 0.83 0.23 0.23 0.83 0.95 0.95 0.83		
Lanes: 1.00 2.00 1.00 1.00 2.00 1.00 0.51 0.49 1.00 0.05 0.95 1.00		
Final Sat: 1770 3725 1583 1770 3725 1583 217 212 1583 90 1717 1583		
Capacity Analysis Module:		
Vol/Sat: 0.25 0.07 0.01 0.01 0.09 0.11 0.42 0.42 0.03 0.30 0.30 0.01		
Crit Moves: ****		
Green/Cycle: 0.28 0.38 0.38 0.03 0.12 0.12 0.48 0.48 0.48 0.48 0.48 0.48		
Volume/Cap: 0.88 0.20 0.03 0.20 0.72 0.88 0.88 0.88 0.06 0.62 0.62 0.02		
Level Of Service Module:		
Delay/Veh: 29.3 10.9 10.2 24.8 25.7 45.8 34.5 34.5 7.1 10.9 10.9 7.0		
User DelAdj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
AdjDel/Veh: 29.3 10.9 10.2 24.8 25.7 45.8 34.5 34.5 7.1 10.9 10.9 7.0		
Queue: 11 4 0 0 8 5 3 3 1 1 9 0		

AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 17-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report 1994 HCM 4-Way Stop Method (Base Volume Alternative)		
Intersection #301 Evan Hewes & Drew		
Cycle (sec): 1	Critical Vol./Cap. (X): 0.411	
Loss Time (sec): 0 (Y+R = 4 sec)	Average Delay (sec/veh): 3.4	
Optimal Cycle: 0	Level Of Service: A	
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control: Stop Sign Stop Sign Stop Sign Stop Sign		
Rights: Include Include Include Include		
Lanes: 0 0 1 0 0 0 0 1 0 0 0 1 0 0 0 1 0 0 1 0		
Volume Module:		
Base Vol: 123 14 31 22 22 7 7 61 39 24 107 7		
Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
Initial Bse: 123 14 31 22 22 7 7 61 39 24 107 7		
User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
PHF Adj: 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90		
PHF Volume: 137 16 34 24 24 8 8 68 43 27 119 8		
Reduced Vol: 0 0 0 0 0 0 0 0 0 0 0 0		
Reduced Vol: 137 16 34 24 24 8 8 68 43 27 119 8		
PCE Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
MLF Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
Final Vol: 137 16 34 24 24 8 8 68 43 27 119 8		
Saturation Flow Module:		
Sat/Lane: 455 455 299 299 299 225 225 225 283 283 283 283		
Adjustment: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
Lanes: 0.73 0.09 0.18 0.43 0.43 0.14 0.13 1.15 0.72 0.35 1.55 0.10		
Final Sat: 333 39 83 128 128 43 30 257 163 99 437 29		
Capacity Analysis Module:		
Vol/Sat: 0.41 0.41 0.41 0.19 0.19 0.19 0.26 0.26 0.26 0.27 0.27 0.27		
Crit Moves: ****		
ApproachV/S: 0.41 0.19 0.26 0.26 0.26 0.26 0.26 0.27		
Level Of Service Module:		
Delay/Veh: 4.8 4.8 4.8 2.0 2.0 2.0 2.7 2.7 2.7 2.8 2.8 2.8		
Delay Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
AdjDel/Veh: 4.8 4.8 4.8 2.0 2.0 2.0 2.7 2.7 2.7 2.8 2.8 2.8		
LOS by Move: A A A A A A A A A A A A		
ApproachDel: 4.8 A 2.0 A 2.7 A 2.8 A		
LOS by Appr: A A A A A A A A A A A A		

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 18-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report 1994 HCM 4-Way Stop Method (Future Volume Alternative)		
Intersection #301 Evan Hewes & Drew		
Cycle (sec):	1	Critical Vol./Cap. (X): 0.755
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 8.3
Optimal Cycle:	0	Level Of Service: B
Approach:	North Bound South Bound East Bound West Bound	
Movement:	L - T - R L - T - R L - T - R L - T - R	
Control:	Stop Sign Stop Sign Stop Sign Stop Sign	
Rights:	Include Include Include Include	
Lanes:	0 0 1 0 0 0 1 0 0 0 1 0 0 1 0 1 0	
Volume Module:		
Base Vol:	123 14 31 22 22 7 7 61 39 24 107 7	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	123 14 31 22 22 7 7 61 39 24 107 7	
Added Vol:	0 0 39 0 0 0 0 117 0 9 28 9	
PasserByVol:	0 0 0 0 0 0 0 0 0 0 0 0	
Initial Fut:	123 14 70 61 22 7 7 178 39 33 135 16	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	137 16 78 68 24 8 8 198 43 37 150 18	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	137 16 78 68 24 8 8 198 43 37 150 18	
Saturation Flow Module:		
Sat/Lane:	306 334 334 278 278 278 300 300 300	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.59 0.07 0.34 0.68 0.24 0.08 0.06 1.59 0.35 0.36 1.46 0.18	
Final Sat:	181 21 103 227 80 27 18 442 96 108 439 53	
Capacity Analysis Module:		
Vol/Sat:	0.75 0.75 0.75 0.30 0.30 0.30 0.45 0.45 0.45 0.34 0.34 0.34	
Crit Moves:	0.75 0.75 0.75 0.30 0.30 0.30 0.45 0.45 0.45 0.34 0.34	
ApproachV/S:	0.75 0.75 0.75 0.30 0.30 0.30 0.45 0.45 0.45 0.34 0.34	
Level Of Service Module:		
Delay/Veh:	17.6 17.6 17.6 3.1 3.1 3.1 5.5 5.5 5.5 3.7 3.7 3.7	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	17.6 17.6 17.6 3.1 3.1 3.1 5.5 5.5 5.5 3.7 3.7 3.7	
LOS by Move:	C C C A A A B B B A A A	
ApproachDel:	17.6 17.6 17.6 3.1 3.1 3.1 5.5 5.5 5.5 3.7 3.7	
LOS by Appr:	C C C A A A B B B A A A	

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AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 19-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report 1994 HCM 4-Way Stop Method (Base Volume Alternative)		
Intersection #302 Evan Hewes & Bennett		
Cycle (sec):	1	Critical Vol./Cap. (X): 0.816
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 7.1
Optimal Cycle:	0	Level Of Service: B
Approach:	North Bound South Bound East Bound West Bound	
Movement:	L - T - R L - T - R L - T - R L - T - R	
Control:	Stop Sign Stop Sign Stop Sign Stop Sign	
Rights:	Include Include Include Include	
Lanes:	0 0 1 0 0 0 1 0 0 1 1 0 0 1 0 0 1	
Volume Module:		
Base Vol:	0 84 0 45 16 16 60 90 1 0 131 272	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	0 84 0 45 16 16 60 90 1 0 131 272	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	0 93 0 50 18 18 67 100 1 0 146 302	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	0 93 0 50 18 18 67 100 1 0 146 302	
Saturation Flow Module:		
Sat/Lane:	174 174 174 303 303 303 443 443 443 370 370 370	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.00 1.00 0.00 0.74 0.26 1.00 1.00 0.99 0.01 0.00 1.00 1.00	
Final Sat:	0 174 0 223 80 303 443 439 4 0 370 370	
Capacity Analysis Module:		
Vol/Sat:	0.00 0.53 0.00 0.22 0.22 0.06 0.15 0.23 0.23 0.00 0.39 0.82	
Crit Moves:	0.53 0.53 0.14 0.19 0.19 0.61	
ApproachV/S:	0.53 0.53 0.14 0.19 0.19 0.61	
Level Of Service Module:		
Delay/Veh:	0.0 7.6 0.0 2.3 2.3 1.3 1.8 2.4 2.4 0.0 4.5 22.2	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	0.0 7.6 0.0 2.3 2.3 1.3 1.8 2.4 2.4 0.0 4.5 22.2	
LOS by Move:	* B * A A A A A A	
ApproachDel:	7.6 7.6 1.7 2.1 2.1 10.0	
LOS by Appr:	B B A A A A B	

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Table D-2

## Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 20-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM 4-Way Stop Method (Future Volume Alternative)		
Intersection #302 Evan Hewes & Bennett		
Cycle (sec):	1	Critical Vol./Cap. (X): 4.557
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 8579.3
Optimal Cycle:	0	Level Of Service: F
Approach:	North Bound South Bound East Bound West Bound	
Movement:	L - T - R L - T - R L - T - R L - T - R	
Control:	Stop Sign	Stop Sign
Rights:	Include	Include
Lanes:	0 0 1 0 0 0 1 0 0 1 1 0 0 1 0 0 1	
Volume Module:		
Base Vol:	0 84 0 45 16 16 60 90 1 0 131 272	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	0 84 0 45 16 16 60 90 1 0 131 272	
Added Vol:	0 261 0 201 62 46 196 0 0 0 848	
PasserByVol:	0 0 0 0 0 0 0 0 0 0 0 0	
Initial Fut:	0 345 0 246 78 62 256 90 1 0 131 1120	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	0 383 0 273 87 69 284 100 1 0 146 1244	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	0 383 0 273 87 69 284 100 1 0 146 1244	
Saturation Flow Module:		
Sat/Lane:	267 267 267 366 366 414 414 414 273 273 273	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.00 1.00 0.00 0.76 0.24 1.00 1.00 0.99 0.01 0.00 1.00 1.00	
Final Sat:	0 267 0 278 88 366 414 410 4 0 273 273	
Capacity Analysis Module:		
Vol/Sat:	0.00 1.43 0.00 0.98 0.98 0.19 0.69 0.24 0.24 0.00 0.53 4.56	
Crit Moves:	****	****
ApproachV/S:	1.43	0.59
Level Of Service Module:		
Delay/Veh:	0.0 233 0.0 42.0 42.0 2.0 13.6 2.5 2.5 0.0 7.6 xxxxx	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	0.0 233 0.0 42.0 42.0 2.0 13.6 2.5 2.5 0.0 7.6 xxxxx	
LOS by Move:	* F * E * A * C * A * B * F	
ApproachDel:	233.0	5.9
LOS by Appr:	F B	F
*****	*****	*****

AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 21-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM 4-Way Stop Method (Base Volume Alternative)		
Intersection #303 Evan Hewes & Forrester		
Cycle (sec):	1	Critical Vol./Cap. (X): 0.792
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 9.0
Optimal Cycle:	0	Level Of Service: B
Approach:	North Bound South Bound East Bound West Bound	
Movement:	L - T - R L - T - R L - T - R L - T - R	
Control:	Stop Sign	Stop Sign
Rights:	Include	Include
Lanes:	0 0 1 0 0 0 0 1 0 0 1 0 0 1 0 0 1 0	
Volume Module:		
Base Vol:	35 65 11 30 107 76 26 170 19 104 239 12	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	35 65 11 30 107 76 26 170 19 104 239 12	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	39 72 12 33 119 84 29 189 21 116 266 13	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	39 72 12 33 119 84 29 189 21 116 266 13	
Saturation Flow Module:		
Sat/Lane:	368 368 298 298 298 329 329 329 384 384 384	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.32 0.58 0.10 0.14 0.50 0.36 1.00 0.90 0.10 1.00 0.95 0.05	
Final Sat:	117 215 36 42 150 106 329 296 33 384 366 18	
Capacity Analysis Module:		
Vol/Sat:	0.33 0.33 0.33 0.79 0.79 0.79 0.09 0.64 0.64 0.30 0.73 0.73	
Crit Moves:	****	****
ApproachV/S:	0.33 0.79 0.36	0.51
Level Of Service Module:		
Delay/Veh:	3.6 3.6 20.3 20.3 20.3 1.4 11.3 11.3 3.2 15.8 15.8	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	3.6 3.6 20.3 20.3 20.3 1.4 11.3 11.3 3.2 15.8 15.8	
LOS by Move:	A A A A D D D A C C A C C	
ApproachDel:	3.6 20.3 4.0 7.1	
LOS by Appr:	A D A A	
*****	*****	*****

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

AM Cum + FA18 Project	Mon Oct 20, 1997 09:47:42	Page 22-1	PM Cum + FA18 Project	Mon Oct 20, 1997 09:49:29	Page 1-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting			Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report			Scenario Report		
1994 HCM 4-Way Stop Method (Future Volume Alternative)			PM Cum + FA18 Project		
Intersection #303 Evan Hewes & Forrester			Command:		
*****			Volume:		
Cycle (sec): 1			Geometry:		
Loss Time (sec): 0 (Y+R = 4 sec)			Impact Fee:		
Optimal Cycle: 0			Trip Generation:		
*****			Trip Distribution:		
Approach: North Bound			Paths:		
Movement: L - T - R			Routes:		
Control: Stop Sign			Configuration:		
Rights: Include			Default		
Lanes: 0 0 1 0 0 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0			PM Cum Base FA18		
Volume Module:			PM Existing		
Base Vol: 35 65 11 30 107 76 26 170 19 104 239 12			Default Impact Fee		
Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00			E2 Default		
Initial Bse: 35 65 11 30 107 76 26 170 19 104 239 12			Default Paths		
Added Vol: 91 0 0 0 0 170 40 139 22 0 587 0			Default Routes		
PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0			Default Configuration		
Initial Fut: 126 65 11 30 107 246 66 309 41 104 826 12			Scenario Report		
User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00			PM Cum + FA18 Project		
PHF Adj: 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90			Command:		
PHF Volume: 140 72 12 33 119 273 73 343 46 116 918 13			Volume:		
Reduced Vol: 0 0 0 0 0 0 0 0 0 0 0 0			Geometry:		
Reduced Vol: 140 72 12 33 119 273 73 343 46 116 918 13			Impact Fee:		
PCE Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00			Trip Generation:		
MLF Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00			Trip Distribution:		
Final Vol: 140 72 12 33 119 273 73 343 46 116 918 13			Paths:		
Saturation Flow Module:			Routes:		
Sat/Lane: 421 421 421 168 168 168 387 387 387 429 429 429			Configuration:		
Adjustment: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00			Default		
Lanes: 0.63 0.32 0.05 0.08 0.28 0.64 1.00 0.88 0.12 1.00 0.99 0.01			PM Cum Base FA18		
Final Sat: 263 135 23 13 47 108 387 341 46 429 423 6			PM Existing		
Capacity Analysis Module:			Default Impact Fee		
Vol/Sat: 0.53 0.53 0.53 2.53 2.53 2.53 0.19 1.01 1.01 0.27 2.17 2.17			E2 Default		
Crit Moves: ****			Default Paths		
ApproachV/S: 0.53 2.53 0.60 1.22			Default Routes		
Level Of Service Module:			Default Configuration		
Delay/Veh: 7.6 7.6 7.6 14959 xxxx 14959 2.0 45.6 45.6 2.8 3815 3815			Scenario Report		
Delay Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00			PM Cum + FA18 Project		
AdjDel/Veh: 7.6 7.6 7.6 14959 xxxx 14959 2.0 45.6 45.6 2.8 3815 3815			Command:		
LOS by Move: B B B F F F A F A F A F F			Volume:		
ApproachDel: 7.6			Geometry:		
LOS by Appr: B			Impact Fee:		
*****			Trip Generation:		

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

PM Cum + FA18 Project		Mon Oct 20, 1997 09:49:29		Page 2-1				
		Traffic Impact Analysis						
F/A-18 E/F Squadron Siting								
		Trip Generation Report						
		Forecast for PM Personnel On-Base						
Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total % Of Trips Total
101	Lemoore Oper	433.00	FA 18 Personnel	0.04	0.04	17	17	34 1.3
	Zone 101 Subtotal					17	17	34 1.3
102	Lemoore Hous	111.00	FA 18 Personnel	0.04	0.04	4	4	8 0.3
	Zone 102 Subtotal					4	4	8 0.3
103	Lemoore Main	464.00	FA 18 Personnel	0.04	0.04	19	19	38 1.5
	Zone 103 Subtotal					19	19	38 1.5
307	NAF El Centr	1890.00	FA 18 Personnel	0.04	0.04	76	76	152 5.8
	Zone 307 Subtotal					76	76	152 5.8
TOTAL						116	116	232 8.9

PM Cum + FA18 Project		Mon Oct 20, 1997 09:49:29		Page 3-1				
		Traffic Impact Analysis						
F/A-18 E/F Squadron Siting								
		Trip Generation Report						
		Forecast for PM Spouses/Dependents On-Base						
Zone #	Subzone	Amount	Units	Rate In	Rate Out	Trips In	Trips Out	Total % Of Trips Total
101	Lemoore Oper	178.00	FA 18 Spouse	0	0.00	53	0	53 2.0
	Zone 101 Subtotal					53	0	53 2.0
102	Lemoore Hous	46.00	FA 18 Spouse	0	0.00	14	0	14 0.5
	Zone 102 Subtotal					14	0	14 0.5
103	Lemoore Main	191.00	FA 18 Spouse	0	0.00	57	0	57 2.2
	Zone 103 Subtotal					57	0	57 2.2
307	NAF El Centr	778.00	FA 18 Spouses	0.30	0.00	233	0	233 8.9
	Zone 307 Subtotal					233	0	233 8.9
TOTAL						357	0	357 13.6

Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

PM Cum + FA18 Project			Mon Oct 20, 1997 09:49:29			Page 4-1			PM Cum + FA18 Project			Mon Oct 20, 1997 09:49:29			Page 5-1		
			Traffic Impact Analysis						Traffic Impact Analysis			F/A-18 E/F Squadron Siting					
			Trip Generation Report						Trip Generation Report								
			Forecast for PM Personnel Off-Base						Forecast for PM Support Personnel Off-Base								
Zone #	Subzone	Amount	Units	Rate	In	Out	Trips	In	Out	Rate	In	Out	Trips	In	Out	Total % Of Trips	Total
101	Lemoore Oper	251.00	FA 18 Personnel	0.03	1.00	0.03	8	251	8	1.00	0.03	1.00	2	52	54	2.1	2.1
	Zone 101 Subtotal						8	251	8				2	52	54	2.1	2.1
102	Lemoore Hous	64.00	FA 18 Personnel	0.03	1.00	0.03	2	64	2	1.00	0.03	1.00	0	13	13	0.5	0.5
	Zone 102 Subtotal						2	64	2				0	13	13	0.5	0.5
103	Lemoore Main	269.00	FA 18 Personnel	0.03	1.00	0.03	8	269	8	1.00	0.03	1.00	2	55	57	2.2	2.2
	Zone 103 Subtotal						8	269	8				2	55	57	2.2	2.2
307	NAF El Centr	1067.00	FA 18 Personnel	0.03	1.00	0.03	32	1067	32	1.00	0.03	1.00	6	200	206	7.9	7.9
	Zone 307 Subtotal						32	1067	32				6	200	206	7.9	7.9
TOTAL							50	1651	50				10	320	330	12.6	12.6



**Table D-2**  
**Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)**

PM Cum + FA18 Project		Mon Oct 20, 1997 09:49:29				Page 7-2				Page 7-3							
		Traffic Impact Analysis				Traffic Impact Analysis				Traffic Impact Analysis							
		F/A-18 E/F Squadron Siting				F/A-18 E/F Squadron Siting				F/A-18 E/F Squadron Siting							
Volume	Northbound	Southbound	Eastbound	Westbound	Total	Volume	Northbound	Southbound	Eastbound	Westbound	Total	Volume	Northbound	Southbound	Eastbound	Westbound	Total
Type	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right	Type	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right	Type	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right	Left Thru Right
<b>#201 Navalair &amp; SR 1 SB Ramps</b>																	
Base	0	203	2	2	88	0	0	0	0	142	0	0	0	0	0	0	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	203	2	2	88	0	0	0	0	142	0	0	0	0	0	0	0
<b>#202 Navalair &amp; Wood</b>																	
Base	0	199	510	8	222	0	0	0	0	45	0	6	990	0	0	0	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	199	510	8	222	0	0	0	0	45	0	6	990	0	0	0	0
<b>#203 N. Mugu &amp; Frontage</b>																	
Base	0	24	84	0	0	26	200	615	0	31	0	0	980	0	0	0	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	24	84	0	0	26	200	615	0	31	0	0	980	0	0	0	0
<b>#204 Main &amp; Frontage</b>																	
Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>#205 Las Posas &amp; SR 1 NB Off Ramp</b>																	
Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>#301 Evan Hewes &amp; Drew</b>																	
Base	17	30	21	19	19	20	21	134	133	24	69	24	531	0	0	0	0
Added	0	0	10	10	0	0	0	31	0	40	121	40	252	0	0	0	0
Total	17	30	31	29	19	20	21	165	133	64	190	64	783	0	0	0	0
<b>#302 Evan Hewes &amp; Bennett</b>																	
Base	1	8	1	306	90	66	12	146	3	1	95	59	788	0	0	0	0
Added	0	69	0	873	269	201	52	0	0	0	0	226	1690	0	0	0	0
Total	1	77	1	1179	359	267	64	146	3	1	95	285	2478	0	0	0	0
<b>#303 Evan Hewes &amp; Forrester</b>																	
Base	22	90	14	31	151	20	89	324	52	17	132	19	961	0	0	0	0
Added	24	0	0	0	0	45	175	604	94	0	156	0	1098	0	0	0	0
Total	46	90	14	31	151	65	264	928	146	17	288	19	2059	0	0	0	0
<b>#401 Alameda &amp; First</b>																	
Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>#402 Alameda &amp; Third</b>																	
Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Added	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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**Table D-2**  
**Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)**

PM Cum + FA18 Project	Mon Oct 20, 1997 09:49:30	Page 8-1	PM Cum + FA18 Project	Mon Oct 20, 1997 15:50:49	Page 9-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting			Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Impact Analysis Report Level Of Service			Level Of Service Computation Report 1994 HCM Operations Method (Base Volume Alternative)		
Intersection	Base Del/V/ LOS Veh C	Future Del/V/ LOS Veh C	Change in		
#101 Jackson & Main Gate	B 13.6 0.407	E 41.0 0.538	+27.329 D/V		
#102 SR 198 WB Ramps & Avenal Cut-O	B 1.8 0.000	B 1.8 0.000	+ 0.000 V/C		
#103 SR 198 EB Ramps & Avenal Cut-O	B 2.3 0.000	B 2.3 0.000	+ 0.000 V/C		
#104 SR 41 & Grangeville	C 15.5 0.632	F 103.0 0.928	+87.538 D/V		
#301 Evan Hewes & Drew	A 3.0 0.360	A 4.1 0.401	+ 0.041 V/C		
#302 Evan Hewes & Bennett	B 6.8 0.944	F OVRF 3.484	+ 2.539 V/C		
#303 Evan Hewes & Forrester	B 9.4 1.069	F 280.7 2.491	+ 1.422 V/C		

Level Of Service Computation Report 1994 HCM Operations Method (Base Volume Alternative)									
Intersection #101 Jackson & Main Gate									
Cycle (sec):	80	Critical Vol./Cap. (X):	0.407						
Loss Time (sec):	12 (Y+R = 3 sec)	Average Delay (sec/veh):	12.9						
Optimal Cycle:	80	Level Of Service:	B						
Approach:	North Bound	South Bound	East Bound	West Bound					
Movement:	L - T - R	L - T - R	L - T - R	L - T - R	L - T - R	L - T - R	L - T - R	L - T - R	L - T - R
Control:	Split Phase	Split Phase	Protected	Protected					
Rights:	Include	Include	Include	Include	Ovl				
Min. Green:	2	25	25	4	39	39	2	37	37
Lanes:	0 1 0 0 1	1 1 0 0 1	1 0 1 0 1	1 0 1 0 1	1	0 2 0 1			
Volume Module:									
Base Vol:	3	6	4	671	6	14	6	195	2
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	3	6	4	671	6	14	6	195	2
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	3	7	4	746	7	16	7	217	2
Reduced Vol:	0	0	0	0	0	0	0	0	0
Reduced Vol:	3	7	4	746	7	16	7	217	2
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.05	1.05	1.00	1.00	1.00	1.00
Final Vol:	3	7	4	783	7	16	7	217	2
Saturation Flow Module:									
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.97	0.97	0.83	0.93	0.93	0.83	0.93	0.98	0.83
Lanes:	0.30	0.70	1.00	1.98	0.02	1.00	1.00	1.00	1.00
Final Sat:	553	1291	1583	3508	31	1583	1770	1863	1583
Capacity Analysis Module:									
Vol/Sat:	0.01	0.01	0.00	0.22	0.22	0.01	0.00	0.12	0.00
Crit Moves:	****	****	****	****	****	****	****	****	****
Green/Cycle:	0.03	0.03	0.03	0.31	0.31	0.31	0.05	0.49	0.03
Volume/Cap:	0.22	0.22	0.10	0.71	0.71	0.03	0.08	0.24	0.00
Level Of Service Module:									
Delay/Veh:	25.1	25.1	24.7	17.3	17.3	12.3	23.4	7.7	6.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	25.1	25.1	24.7	17.3	17.3	12.3	23.4	7.7	6.8
Queue:	0	0	0	16	0	0	3	0	0

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

PM Cum + FA18 Project	Mon Oct 20, 1997 09:49:30	Page 12-1
Traffic Impact Analysis		
F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM Unsignalized Method (Future Volume Alternative)		
Intersection #102 SR 198 WB Ramps & Avenal Cut-Off		
Average Delay (sec/veh): 1.8 Worst Case Level Of Service: B		
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control: Uncontrolled Uncontrolled Uncontrolled Uncontrolled	Stop Sign	Stop Sign
Rights: Include Include Include Include	Include	Include
Lanes: 0 1 0 0 0 0 1 0 1 0 0 0 0 1 0 0 0 1		
Volume Module:		
Base Vol: 9 6 0 0 356 3 0 0 0 0 72 0 169		
Growth Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
Initial Bse: 9 6 0 0 356 3 0 0 0 0 72 0 169		
Added Vol: 5 2 0 0 81 0 0 0 0 0 0 0 18		
PasserByVol: 0 0 0 0 0 0 0 0 0 0 0 0		
Initial Fut: 14 8 0 0 437 3 0 0 0 0 72 0 187		
User Adj: 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00		
PHF Adj: 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90		
PHF Volume: 16 9 0 0 486 3 0 0 0 0 80 0 208		
Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0		
Final Vol: 16 9 0 0 486 3 0 0 0 0 80 0 208		
Adjusted Volume Module:		
Grade: 0%		
% Cycle/Cars: xxxx xxxx 0% 0% 0% 0% 0% 0%		
% Truck/Comb: xxxx xxxx 0% 0% 0% 0% 0% 0%		
PCE Adj: 1.10 1.00 1.00 1.10 1.00 1.10 1.10 1.10 1.10		
Cycl/Car PCE: xxxx xxxx 1.10 1.00 1.00 1.10 1.10 1.10 1.10		
Trck/Comb PCE: xxxx xxxx 1.10 1.00 1.00 1.10 1.10 1.10 1.10		
Adj Vol: 17 9 0 0 486 3 0 0 0 0 88 0 229		
Critical Gap Module:		
MoveUp Time: 2.1 xxxx xxxx 3.4 xxxx 3.4 xxxx 2.6		
Critical Gp: 5.0 xxxx xxxx 6.5 xxxx 6.5 xxxx 5.5		
Capacity Module:		
Conflict Vol: 489 xxxx xxxx 510 xxxx 9		
Potent Cap: 1003 xxxx xxxx 536 xxxx 1370		
Adj Cap: 1.00 xxxx xxxx 0.98 xxxx 1.00		
Move Cap: 1003 xxxx xxxx 527 xxxx 1370		
Level Of Service Module:		
Stopped Del: 3.6 xxxx xxxx 8.0 xxxx 3.1		
LOS by Move: A + + + + + B + A		
Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT		
Shared Cap: xxxx xxxx xxxx 600 xxxx 600		
Shrd StpDel: xxxx xxxx xxxx 6.0 xxxx 6.0		
Shared LOS: + + + + + B + B +		
ApproachDel: 2.4 0.0 0.0 4.5		

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PM Cum + FA18 Project	Mon Oct 20, 1997 09:49:30	Page 13-1
Traffic Impact Analysis		
F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM Unsignalized Method (Base Volume Alternative)		
Intersection #103 SR 198 EB Ramps & Avenal Cut-Off		
Average Delay (sec/veh): 2.3 Worst Case Level Of Service: B		
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control: Uncontrolled Uncontrolled Uncontrolled Uncontrolled	Stop Sign	Stop Sign
Rights: Include Include Include Include	Include	Include
Lanes: 1 0 1 0 1 1 0 1 0 1 0 1 0 1 0 1		
Volume Module:		
Base Vol: 197 1 6 7 80 330 3 16 11 1 1 7		
Growth Adj: 1.00 1.00 0.00 1.00 1.00 0.00 1.00 1.00 1.00		
Initial Bse: 197 1 0 7 80 0 3 16 11 1 1 7		
User Adj: 1.00 1.00 0.00 1.00 1.00 0.00 1.00 1.00 1.00		
PHF Adj: 0.90 0.90 0.00 0.90 0.90 0.00 0.90 0.90 0.90		
PHF Volume: 219 1 0 8 89 0 3 18 12 1 1 8		
Reduct Vol: 0 0 0 0 0 0 0 0 0 0 0 0		
Final Vol: 219 1 0 8 89 0 3 18 12 1 1 8		
Adjusted Volume Module:		
Grade: 0%		
% Cycle/Cars: xxxx xxxx 0% 0% 0% 0% 0% 0%		
% Truck/Comb: xxxx xxxx 0% 0% 0% 0% 0% 0%		
PCE Adj: 1.10 1.00 1.00 1.10 1.00 1.00 1.10 1.10 1.10		
Cycl/Car PCE: xxxx xxxx 1.10 1.00 1.00 1.10 1.10 1.10 1.10		
Trck/Comb PCE: xxxx xxxx 1.10 1.00 1.00 1.10 1.10 1.10 1.10		
Adj Vol: 241 1 0 9 89 0 4 20 13 1 1 9		
Critical Gap Module:		
MoveUp Time: 2.1 xxxx xxxx 3.4 3.3 2.6 3.4 3.3 2.6		
Critical Gp: 5.0 xxxx xxxx 6.5 6.0 5.5 6.5 6.0 5.5		
Capacity Module:		
Conflict Vol: 89 xxxx xxxx 321 317 89 332 317 1		
Potent Cap: 1555 xxxx xxxx 690 744 1248 680 744 1383		
Adj Cap: 1.00 xxxx xxxx 0.87 0.84 1.00 0.85 0.84 1.00		
Move Cap: 1555 xxxx xxxx 601 626 1248 577 626 1383		
Level Of Service Module:		
Stopped Del: 2.7 xxxx xxxx 6.0 5.9 2.9 6.2 5.8 2.6		
LOS by Move: A + + + + + B A + A		
Movement: LT - LTR - RT LT - LTR - RT LT - LTR - RT		
Shared Cap: xxxx xxxx xxxx 622 xxxx 600		
Shrd StpDel: xxxx xxxx xxxx 6.0 xxxx 6.0		
Shared LOS: + + + + + B + B +		
ApproachDel: 2.7 0.2 4.8 3.4		

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

PM Cum + FA18 Project		Mon Oct 20, 1997 09:49:30		Page 16-1	
Traffic Impact Analysis		F/A-18 E/F Squadron Siting		Page 17-1	
Level Of Service Computation Report		F/A-18 E/F Squadron Siting		Page 17-1	
1994 HCM Operations Method (Future Volume Alternative)		F/A-18 E/F Squadron Siting		Page 17-1	
Intersection #104 SR 41 & Grangeville		F/A-18 E/F Squadron Siting		Page 17-1	
Cycle (sec):		Critical Vol./Cap. (X):		0.928	
Loss Time (sec):		Average Delay (sec/veh):		103.0	
Optimal Cycle:		Level Of Service:		F	
Approach:		North Bound South Bound East Bound West Bound			
Movement:		L - T - R L - T - R L - T - R L - T - R			
Control:		Protected Protected Protected Permitted			
Rights:		Include Include Include Include			
Min. Green:		18 30 30 3 15 15 35 35 35 35 35 35			
Lanes:		1 0 2 0 1 1 0 2 0 1 0 1 0 1 0 1			
Volume Module:					
Base Vol:		115 327 26 18 278 39 197 254 73 40 110 16			
Growth Adj:		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00			
Initial Bse:		115 327 26 18 278 39 197 254 73 40 110 16			
Added Vol:		24 0 0 0 0 0 0 0 0 0 0 0			
PasserByVol:		0 0 0 0 0 0 0 0 0 0 0 0			
Initial Fut:		139 327 26 18 278 57 271 404 169 40 148 16			
User Adj:		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00			
PHF Adj:		0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90			
PHF Volume:		154 363 29 20 309 63 301 449 188 44 164 18			
Reduced Vol:		0 0 0 0 0 0 0 0 0 0 0 0			
Reduced Vol:		154 363 29 20 309 63 301 449 188 44 164 18			
PCE Adj:		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00			
MLF Adj:		1.00 1.05 1.00 1.00 1.05 1.00 1.00 1.00 1.00 1.00 1.00 1.00			
Final Vol:		154 382 29 20 324 63 301 449 188 44 164 18			
Saturation Flow Module:					
Sat/Lane:		1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900			
Adjustment:		0.93 0.98 0.83 0.93 0.98 0.83 0.61 0.61 0.83 0.36 0.36 0.83			
Lanes:		1.00 2.00 1.00 1.00 2.00 1.00 0.40 0.60 1.00 0.21 0.79 1.00			
Final Sat:		1770 3725 1593 1770 3725 1593 464 691 1583 146 543 1583			
Capacity Analysis Module:					
Vol/Sat:		0.09 0.10 0.02 0.01 0.09 0.04 0.65 0.65 0.12 0.30 0.30 0.01			
Crit Moves:		****			
Green/Cycle:		0.23 0.38 0.38 0.04 0.19 0.19 0.48 0.48 0.48 0.48 0.48 0.48			
Volume/Cap:		0.39 0.27 0.05 0.30 0.46 0.21 1.37 1.37 0.25 0.64 0.64 0.02			
Level Of Service Module:					
Delay/Veh:		17.3 11.3 10.3 25.0 19.0 17.8 267.4 267 8.1 13.0 13.0 7.2			
User DelAdj:		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00			
AdjDel/Veh:		17.3 11.3 10.3 25.0 19.0 17.8 267.4 267 8.1 13.0 13.0 7.2			
Queue:		3 6 0 0 6 1 32 46 2 1 3 0			

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

PM Cum + FA18 Project	Mon Oct 20, 1997 09:49:30	Page 18-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM 4-Way Stop Method (Future Volume Alternative)		
Intersection #301 Evan Hewes & Drew		
Cycle (sec):	1	Critical Vol./Cap. (X): 0.401
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 4.1
Optimal Cycle:	0	Level Of Service: A
Approach:	North Bound South Bound East Bound West Bound	
Movement:	L - T - R L - T - R L - T - R L - T - R	
Control:	Stop Sign Stop Sign Stop Sign Stop Sign	
Rights:	Include Include Include Include	
Lanes:	0 0 1 0 0 0 1 0 0 0 1 0 0 1 0 0	
Volume Module:		
Base Vol:	17 30 21 19 19 20 21 134 133 24 69 24	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	17 30 21 19 19 20 21 134 133 24 69 24	
Added Vol:	0 0 10 0 0 0 0 31 0 40 121 40	
PasserByVol:	0 0 0 0 0 0 0 0 0 0 0 0	
Initial Fut:	17 30 31 29 19 20 21 165 133 64 190 64	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	19 33 34 32 21 22 23 183 148 71 211 71	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	19 33 34 32 21 22 23 183 148 71 211 71	
Saturation Flow Module:		
Sat/Lane:	244 244 244 323 323 323 441 441 441 483 483 483	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.22 0.38 0.40 0.43 0.28 0.29 0.13 1.03 0.84 0.40 1.20 0.40	
Final Sat:	54 94 96 138 90 95 57 456 369 194 577 194	
Capacity Analysis Module:		
Vol/Sat:	0.35 0.35 0.35 0.23 0.23 0.23 0.40 0.40 0.40 0.37 0.37 0.37	
Crit Moves:	0.35 0.35 0.35 0.23 0.23 0.23 0.40 0.40 0.40 0.37 0.37 0.37	
ApproachV/S:	0.35 0.35 0.35 0.23 0.23 0.23 0.40 0.40 0.40 0.37 0.37 0.37	
Level Of Service Module:		
Delay/Veh:	3.8 3.8 3.8 2.4 2.4 2.4 4.6 4.6 4.6 4.0 4.0 4.0	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	3.8 3.8 3.8 2.4 2.4 2.4 4.6 4.6 4.6 4.0 4.0 4.0	
LOS by Move:	A A A A A A A A A A A A	
ApproachDel:	3.8 3.8 3.8 2.4 2.4 2.4 4.6 4.6 4.6 4.0 4.0 4.0	
LOS by Appr:	A A A A A A A A A A A A	

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PM Cum + FA18 Project	Mon Oct 20, 1997 09:49:30	Page 19-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM 4-Way Stop Method (Base Volume Alternative)		
Intersection #302 Evan Hewes & Bennett		
Cycle (sec):	1	Critical Vol./Cap. (X): 0.944
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 6.8
Optimal Cycle:	0	Level Of Service: B
Approach:	North Bound South Bound East Bound West Bound	
Movement:	L - T - R L - T - R L - T - R L - T - R	
Control:	Stop Sign Stop Sign Stop Sign Stop Sign	
Rights:	Include Include Include Include	
Lanes:	0 0 1 0 0 0 1 0 0 1 1 0 0 1 0 0 1	
Volume Module:		
Base Vol:	1 8 1 306 90 66 12 146 3 1 95 59	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	1 8 1 306 90 66 12 146 3 1 95 59	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	1 9 1 340 100 73 13 162 3 1 106 66	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	1 9 1 340 100 73 13 162 3 1 106 66	
Saturation Flow Module:		
Sat/Lane:	299 299 299 466 466 466 232 232 232 184 184 184	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.09 0.82 0.09 0.77 0.23 1.00 1.00 0.98 0.02 0.01 0.99 1.00	
Final Sat:	27 245 27 360 106 466 232 228 4 2 182 184	
Capacity Analysis Module:		
Vol/Sat:	0.04 0.04 0.04 0.94 0.94 0.16 0.06 0.71 0.71 0.58 0.58 0.36	
Crit Moves:	0.04 0.04 0.04 0.94 0.94 0.16 0.06 0.71 0.71 0.58 0.58 0.36	
ApproachV/S:	0.04 0.04 0.04 0.94 0.94 0.16 0.06 0.71 0.71 0.58 0.58 0.36	
Level Of Service Module:		
Delay/Veh:	1.2 1.2 1.2 36.2 36.2 36.2 1.8 1.2 14.9 14.9 9.1 9.1	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	1.2 1.2 1.2 36.2 36.2 36.2 1.8 1.2 14.9 14.9 9.1 9.1	
LOS by Move:	A A A A A A A A A A A A	
ApproachDel:	1.2 1.2 1.2 36.2 36.2 36.2 1.8 1.2 14.9 14.9 9.1 9.1	
LOS by Appr:	A A A A A A A A A A A A	

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

PM Cum + FA18 Project	Mon Oct 20, 1997 09:49:30	Page 20-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report 1994 HCM 4-Way Stop Method (Future Volume Alternative)		
Intersection #302 Evan Hewes & Bennett		
Cycle (sec):	1	Critical Vol./Cap. (X): 3.484
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 1592.1
Optimal Cycle:	0	Level Of Service: F
Approach:	North Bound South Bound East Bound West Bound	
Movement:	L - T - R L - T - R L - T - R L - T - R	
Control:	Stop Sign Stop Sign Stop Sign Stop Sign	
Rights:	Include Include Include Include	
Lanes:	0 0 1 0 0 0 1 0 0 1 1 0 0 1 0 0 1	
Volume Module:		
Base Vol:	1 8 1 306 90 66 12 146 3 1 95 59	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	1 8 1 306 90 66 12 146 3 1 95 59	
Added Vol:	0 69 0 873 269 201 52 0 0 0 0 226	
PasserByVol:	0 0 0 0 0 0 0 0 0 0 0 0	
Initial Fut:	1 77 1 1179 359 267 64 146 3 1 95 285	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	1 86 1 1310 399 297 71 162 3 1 106 317	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PCE Adj:	1 86 1 1310 399 297 71 162 3 1 106 317	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	1 86 1 1310 399 297 71 162 3 1 106 317	
Saturation Flow Module:		
Sat/Lane:	488 488 581 581 199 199 199 199 91 91 91	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.01 0.98 0.01 0.77 0.23 1.00 1.00 0.98 0.02 0.01 0.99 1.00	
Final Sat:	6 477 6 445 136 581 199 195 4 1 90 91	
Capacity Analysis Module:		
Vol/Sat:	0.18 0.18 0.18 2.94 2.94 0.51 0.36 0.83 0.83 1.18 1.18 3.48	
Crit Moves:	****	
ApproachV/S:	0.18 1.73 0.59 2.33	
Level Of Service Module:		
Delay/Veh:	2.0 2.0 2.0 71512 xxxx 7.0 3.9 23.4 23.4 87.2 87.2 xxxxxx	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	2.0 2.0 2.0 71512 xxxx 7.0 3.9 23.4 23.4 87.2 87.2 xxxxxx	
LOS by Move:	A A A F F B A D D F F F F	
ApproachDel:	2.0 706.3 9.5 6993.6	
LOS by Appr:	A A B F	

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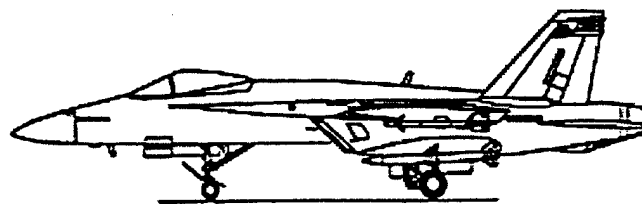
PM Cum + FA18 Project	Mon Oct 20, 1997 09:49:30	Page 21-1
Traffic Impact Analysis F/A-18 E/F Squadron Siting		
Level Of Service Computation Report 1994 HCM 4-Way Stop Method (Base Volume Alternative)		
Intersection #303 Evan Hewes & Forrester		
Cycle (sec):	1	Critical Vol./Cap. (X): 1.069
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 9.4
Optimal Cycle:	0	Level Of Service: B
Approach:	North Bound South Bound East Bound West Bound	
Movement:	L - T - R L - T - R L - T - R L - T - R	
Control:	Stop Sign Stop Sign Stop Sign Stop Sign	
Rights:	Include Include Include Include	
Lanes:	0 0 1 0 0 0 0 1 0 0 1 0 0 1 0 0 1	
Volume Module:		
Base Vol:	22 90 14 31 151 20 89 324 52 17 132 19	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	22 90 14 31 151 20 89 324 52 17 132 19	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	24 100 16 34 168 22 99 360 58 19 147 21	
Reduced Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
PCE Adj:	24 100 16 34 168 22 99 360 58 19 147 21	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	24 100 16 34 168 22 99 360 58 19 147 21	
Saturation Flow Module:		
Sat/Lane:	335 335 335 335 391 391 391 391 331 331 331	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.17 0.72 0.11 0.15 0.75 0.10 1.00 0.86 0.14 1.00 0.88 0.12	
Final Sat:	57 239 38 54 266 35 391 337 54 331 290 41	
Capacity Analysis Module:		
Vol/Sat:	0.42 0.42 0.42 0.63 0.63 0.63 0.25 1.07 1.07 0.06 0.51 0.51	
Crit Moves:	****	
ApproachV/S:	0.42 0.63 0.66 0.28	
Level Of Service Module:		
Delay/Veh:	4.9 4.9 4.9 11.0 11.0 11.0 2.6 58.1 58.1 1.2 6.9 6.9	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	4.9 4.9 4.9 11.0 11.0 11.0 2.6 58.1 58.1 1.2 6.9 6.9	
LOS by Move:	A A A C C C A F F A B B	
ApproachDel:	4.9 11.0 12.3 C	
LOS by Appr:	A C C	

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Table D-2  
Traffic Impact Analysis: Cumulative AM and PM + F/A-18E/F Traffic (continued)

PM Cum + FA18 Project	Mon Oct 20, 1997 09:49:30	Page 22-1
Traffic Impact Analysis		
F/A-18 E/F Squadron Siting		
Level Of Service Computation Report		
1994 HCM 4-Way Stop Method (Future Volume Alternative)		
Intersection #303 Evan Hewes & Forrester		
Cycle (sec):	1	Critical Vol./Cap. (X): 2.491
Loss Time (sec):	0 (Y+R = 4 sec)	Average Delay (sec/veh): 280.7
Optimal Cycle:	0	Level Of Service: F
Approach: North Bound South Bound East Bound West Bound		
Movement: L - T - R L - T - R L - T - R L - T - R		
Control: Stop Sign Stop Sign Stop Sign Stop Sign		
Rights: Include Include Include Include		
Lanes: 0 0 1 0 0 0 0 1 0 0 1 0 0 1 0 0 1 0		
Volume Module:		
Base Vol:	22 90 14 31 151 20 89 324 52 17 132 19	
Growth Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Initial Bse:	22 90 14 31 151 20 89 324 52 17 132 19	
Added Vol:	24 0 0 0 0 45 175 604 94 0 156 0	
PasserByVol:	0 0 0 0 0 0 0 0 0 0 0 0	
Initial Fut:	46 90 14 31 151 65 264 928 146 17 288 19	
User Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
PHF Adj:	0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90	
PHF Volume:	51 100 16 34 168 72 293 1031 162 19 320 21	
Reduct Vol:	0 0 0 0 0 0 0 0 0 0 0 0	
Reduced Vol:	51 100 16 34 168 72 293 1031 162 19 320 21	
PCE Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
MLF Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Final Vol:	51 100 16 34 168 72 293 1031 162 19 320 21	
Saturation Flow Module:		
Sat/Lane:	251 251 177 177 177 479 479 388 388	
Adjustment:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
Lanes:	0.30 0.60 0.10 0.12 0.62 0.26 1.00 0.86 0.14 1.00 0.94 0.06	
Final Sat:	77 150 24 22 109 47 479 414 65 388 364 24	
Capacity Analysis Module:		
Vol/Sat:	0.67 0.67 0.67 1.55 1.55 1.55 0.61 2.49 2.49 0.05 0.88 0.88	
Crit Moves:	***	***
ApproachV/S:	0.67 1.55 1.55 1.55	0.46
Level Of Service Module:		
Delay/Veh:	12.5 12.5 12.5 358.7 359 358.7 10.2 xxxx 12891 1.2 28.2 28.2	
Delay Adj:	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	
AdjDel/Veh:	12.5 12.5 12.5 358.7 359 358.7 10.2 xxxx 12891 1.2 28.2 28.2	
LOS by Move:	C C C C F F F C F F A D D	
ApproachDel:	12.5 358.7 363.0 5.8	
LOS by Appr:	C F F	B
*****		

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AM AND PM MITIGATION PLUS F/A-18E/F TRAFFIC

Table D-3  
Traffic Impact Analysis: Mitigation AM and PM + F/A-18E/F Traffic

MITIG8 - PM Existing + FA18Mon Oct 20, 1997 10:32:20

Page 1-1

Traffic Impact Analysis

F/A-18 E/F Squadron Siting

Level Of Service Computation Report

1994 HCM Operations Method (Future Volume Alternative)

Intersection #104 SR 41 & Grangeville

\*\*\*\*\*

Cycle (sec):

90

Critical Vol./Cap. (X):

0.755

Loss Time (sec):

9 (Y+R = 9 sec)

Average Delay (sec/veh):

24.5

Optimal Cycle:

77

Level Of Service:

C

\*\*\*\*\*

Approach:

North Bound South Bound East Bound West Bound

Movement:

L - T - R L - T - R L - T - R L - T - R

Control:

Protected Protected Permitted

Rights:

Include Include Include

Min. Green:

18 30 30 3 15 15 35 35 35 35 35 35

Lanes:

1 0 2 0 1 1 0 2 0 1 0 1 0 1 0 1

\*\*\*\*\*

Volume Module:

Base Vol:

109 254 21 18 198 33 166 191 31 35 101 16

Growth Adj:

1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

Initial Bse:

109 254 21 18 198 33 166 191 31 35 101 16

Added Vol:

24 0 0 0 0 18 74 150 96 0 38 0

PasserByVol:

0 0 0 0 0 0 0 0 0 0 0

Initial Fut:

133 254 21 18 198 51 240 341 127 35 139 16

User Adj:

1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

PHF Adj:

0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90

PHF Volume:

148 282 23 20 220 57 267 379 141 39 154 18

Reduced Vol:

0 0 0 0 0 0 0 0 0 0 0

Reduced Vol:

148 282 23 20 220 57 267 379 141 39 154 18

PCE Adj:

1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

MLF Adj:

1.00 1.05 1.00 1.00 1.05 1.00 1.00 1.00 1.00 1.00 1.00

Final Vol:

148 296 23 20 231 57 267 379 141 39 154 18

\*\*\*\*\*

Saturation Flow Module:

Sat/Lane:

1900 1900 1900 1900 1900 1900 1900 1900

Adjustment:

0.93 0.98 0.83 0.93 0.98 0.83 0.64 0.64 0.83 0.49 0.49 0.83

Lanes:

1.00 2.00 1.00 1.00 2.00 1.00 0.41 0.59 1.00 0.20 0.80 1.00

Final Sat:

1770 3725 1583 1770 3725 1583 500 710 1583 188 743 1583

\*\*\*\*\*

Capacity Analysis Module:

Vol/Sat:

0.08 0.08 0.01 0.01 0.06 0.04 0.53 0.53 0.09 0.21 0.21 0.01

Crit Moves:

\*\*\*

Green/Cycle:

0.20 0.33 0.33 0.03 0.17 0.17 0.53 0.53 0.53 0.53 0.53 0.53

Volume/Cap:

0.42 0.24 0.04 0.34 0.37 0.22 1.00 1.00 0.17 0.39 0.39 0.02

\*\*\*\*\*

Level Of Service Module:

Delay/Veh:

20.8 14.1 13.1 28.8 21.7 21.0 40.9 40.9 7.0 8.3 8.3 6.4

User DelAdj:

1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00

AdjDel/Veh:

20.8 14.1 13.1 28.8 21.7 21.0 40.9 40.9 7.0 8.3 8.3 6.4

Queue:

3 5 0 1 5 1 11 14 2 1 2 0

\*\*\*\*\*

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Table D-3

## Traffic Impact Analysis: Mitigation AM and PM + F/A-18E/F Traffic (continued)

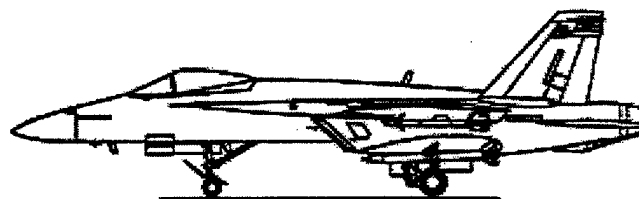
MITIG8 - AM Cum + FA18 ProjMon Oct 20, 1997 17:18:43										Page 1-1									
Traffic Impact Analysis										Page 1-1									
F/A-18 E/F Squadron Siting										Page 1-1									
Level Of Service Computation Report										Page 1-1									
1994 HCM Operations Method (Future Volume Alternative)										Page 1-1									
Intersection #101 Jackson & Main Gate										Page 1-1									
Cycle (sec): 120 Critical Vol./Cap. (X): 0.945										Page 1-1									
Loss Time (sec): 12 (Y+R = 3 sec) Average Delay (sec/veh): 24.3										Page 1-1									
Optimal Cycle: 152 Level Of Service: C										Page 1-1									
Approach: North Bound South Bound East Bound West Bound										Page 1-1									
Movement: L - T - R L - T - R L - T - R L - T - R										Page 1-1									
Control: Split Phase Split Phase Protected Protected										Page 1-1									
Rights: Include Include Include Include										Page 1-1									
Min. Green: 3 3 4 4 3 3 3 3 5 5 5 5										Page 1-1									
Lanes: 0 1 0 0 1 1 0 0 1 1 1 0 1 0 1 1 0 1 0 1										Page 1-1									
Volume Module:										Page 1-1									
Base Vol:	2	6	4	61	6	8	72	2	10	150	865								
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00								
Initial Bse:	2	6	4	61	6	8	72	2	10	150	865								
Added Vol:	0	0	0	74	0	2	7	0	0	0	326								
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0								
Initial Fut:	2	6	4	135	6	10	15	72	2	10	150	1191							
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00								
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90								
PHF Volume:	2	7	4	150	7	11	17	80	2	11	167	1323							
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0								
Reduced Vol:	2	7	4	150	7	11	17	80	2	11	167	1323							
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00								
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00								
Final Vol:	2	7	4	150	7	12	17	80	2	11	167	1323							
Saturation Flow Module:										Page 1-1									
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900								
Adjustment:	0.97	0.97	0.83	0.93	0.89	0.89	0.93	0.98	0.83	0.93	0.98	0.83							
Lanes:	0.22	0.78	1.00	1.00	0.74	1.26	1.00	1.00	1.00	1.00	1.00	1.00							
Final Sat:	410	1434	1593	1770	1249	2141	1770	1863	1583	1770	1863	1583							
Capacity Analysis Module:										Page 1-1									
Vol/Sat:	0.00	0.00	0.00	0.08	0.01	0.01	0.01	0.04	0.00	0.01	0.09	0.84							
Crit Moves:	***	***	***	***	***	***	***	***	***	***	***	***							
Green/Cycle:	0.03	0.03	0.03	0.09	0.09	0.09	0.03	0.72	0.72	0.07	0.76	0.85							
Volume/Cap:	0.20	0.20	0.10	0.98	0.06	0.06	0.38	0.06	0.00	0.09	0.12	0.98							
Level Of Service Module:										Page 1-1									
Delay/Veh:	37.3	37.3	37.0	86.3	32.5	32.5	39.9	3.2	3.0	33.9	2.4	20.8							
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
AdjDel/Veh:	37.3	37.3	37.0	86.3	32.5	32.5	39.9	3.2	3.0	33.9	2.4	20.8							
Queue:	0	0	0	8	0	0	1	1	0	0	0	1							
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****							
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APPENDIX E  
AIR QUALITY/CONFORMITY DETERMINATION

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## **APPENDIX E**

### **AIR QUALITY/CONFORMITY DETERMINATION**

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#### **E.1 INTRODUCTION**

This appendix contains documentation for the air quality analyses presented in Chapter 4 of the EIS. In addition, this appendix contains a discussion of Clean Air Act conformity requirements plus a draft conformity determination for the NAS Lemoore Alternative. A draft conformity determination for the NAF El Centro Alternative is included in the attachments at the end of this appendix.

Extensive tabular summaries of data and emissions analyses are presented as a series of attachments to this appendix. For convenience, these attachments are grouped by emission source categories. Most tables in the attachments include footnotes and data source references that further explain the details of the emission estimates.

#### **E.2 PROCEDURES USED FOR EMISSION ESTIMATES**

Emissions analyses are used as the basis for most NEPA impact evaluations and as the basis for the Clean Air Act conformity analysis. Emissions analyses used for NEPA impact assessment purposes are broader than those used for conformity determination purposes. The description of analysis procedures used for different categories of emission sources identifies the types of emission sources included only in NEPA impact analyses.

##### **E.2.1 Construction Activity**

Emission estimates for facility construction activities account for fugitive dust from construction sites plus exhaust emissions from heavy construction equipment. Site disturbance and heavy equipment use will be important only for new construction or facility expansion. Interior building renovations and the interior finishing stage of building construction are assumed to have minimal air quality impacts.

Aircraft-related and training-related facilities are programmed for the initial construction efforts, while housing facilities and personnel support facilities are programmed on a more extended construction schedule. The NAS Lemoore Alternative would require the least amount of construction because the second phase of F/A-18E/F aircraft arrivals would be replacements for existing aircraft, and therefore not require additional facilities. In contrast, the second phase of F/A-18E/F aircraft arrivals at NAF El Centro would be entirely new aircraft, and would therefore require additional facility construction.

Construction site acreages were based on building size estimates, with most structures assumed to be single story construction. Disturbed areas for construction sites were assumed to occupy as much as twice the facility footprint.

Emission estimates for facility construction were developed from splitting the overall construction activity into two phases: site/foundation preparation and facility construction. It was assumed that site and foundation preparation activities would disturb the entire construction site, while building construction activities would only disturb areas outside the building footprint. Site disturbance activities were assumed to be concentrated in the construction initiation year.

Table E-1 presents construction site acreage estimates for the NAS Lemoore Alternative. Tables E-2 through E-9 present 1999 through 2002 construction emission estimates for the NAS Lemoore Alternative. Construction would not be required after 2002 since phase two aircraft would replace existing squadrons.

Table E-10 presents construction site acreage estimates for the NAF El Centro Alternative. Tables E-11 through E-28 present construction emission estimates for the NAF El Centro Alternative. Construction activities for the first phase of F/A-18E/F aircraft arrivals would begin in 1999 and continue throughout 2002. Construction activities for the second phase of F/A-18E/F aircraft arrivals would begin in 2005 and continue throughout 2009.

Construction emission estimates are based on data and procedures outlined in U.S. Environmental Protection Agency (1985a, 1995). Available fugitive dust emission factors for generalized construction activity are based on data collected with TSP (total suspended particulate matter) sampling equipment. TSP samplers collect a broader range of particle sizes than those collected by PM<sub>10</sub> samplers. PM<sub>10</sub> samplers collect particles with aerodynamic equivalent diameters smaller than 45-50 microns (40 CFR 53.43). The "10" in PM<sub>10</sub> is not a size limit; it is the particle size class (9.5-10.5 microns aerodynamic equivalent diameter) collected with a sampling efficiency of 50 percent by mass.

The PM<sub>10</sub> portion of fugitive dust is estimated as somewhat less than the silt plus clay fraction of typical soils, with additional emission rate adjustments for the effectiveness of anticipated dust control practices. The resulting emission rate is

about 9.8 pounds per acre-day of construction activity for the NAS Lemoore Alternative and 8 pounds per acre-day of construction activity for the NAF El Centro Alternative. Construction equipment exhaust emission rates are taken from U.S. Environmental Protection Agency (1985b). Construction equipment and fugitive dust emission rate assumptions are summarized in Table E-29.

#### **E.2.2 F/A-18E/F AIRCRAFT OPERATIONS**

Aircraft emission estimates have been prepared in a manner consistent with procedures outlined in U.S. Environmental Protection Agency (1992). Aircraft fuel use rates and emission factors as a function of fuel flow were based on data from the Navy's Aircraft Environmental Support Office (U.S. Navy 1990 1997). Time-in-mode estimates for different categories of flight events were provided by the E/F Fleet Introduction Team (FIT) at NAS Lemoore. To be consistent with normal emission inventory procedures, only emissions released within 3,000 feet of ground level are included in the analysis.

Table E-30 summarizes data used for the analysis of F/A-18 flight activity emissions. Flight activity estimates are presented by various squadron groupings: the Fleet Replacement Squadron (FRS), the four Phase 1 fleet squadrons, the six Phase 2 fleet squadrons, and the six existing F/A-18C/D squadrons that would be replaced during Phase 2 under the NAS Lemoore Alternative.

Phase 1 would produce a maximum of 92 additional aircraft operating from NAS Lemoore or NAF El Centro in any one year. Phase 2 would increase the number of F-18E/F aircraft by 72, bringing the total number of F/A-18E/F aircraft to 164. For the NAS Lemoore Alternative, however, the 72 aircraft added during Phase 2 would be one-for-one replacements of existing F/A-18C/D aircraft already stationed at NAS Lemoore. For the NAF El Centro Alternative, all 164 aircraft would be new to the base.

The flight operation numbers listed in Table E-30 are those conducted at the home base for the F/A-18E/F aircraft. Flight operations conducted outside the relevant air basin are not included.

Table E-31 presents the estimated annual emissions from F/A-18 aircraft flight operations. Emission analyses presented in Table E-31 are organized by squadron groupings as was done for Table E-30. Table E-31 shows estimated emissions in two formats: as typical summer/winter day emissions (pounds per day), and as annual emissions (tons per year). Many air quality management plans present emission inventories and forecasts in a summer/winter day or average day format. Clean Air Act conformity rules include emission threshold specified in a tons per year format.

In addition to direct flight operations, there will be emissions associated with engine tests performed after engine maintenance. In-frame engine run-ups are performed when maintenance activities do not require removing the engine from

the aircraft. Depending on the nature of in-frame engine maintenance, run-ups will be performed in either a low power or high power mode. The high power in-frame test lasts longer, and includes engine operation at full power and afterburner modes. Emission estimates for in-frame engine run-ups are presented in Table E-32.

Impact assessments presented in this EIS have generally focused on conditions at the end of Phase 1 and Phase 2. Clean Air Act conformity requirements, however, require analyses of emissions for individual calendar years between the start of facility construction and full operational conditions. Table E-34 presents a summary of the aircraft and flight operation assumptions used to extrapolate Phase 1 and Phase 2 conditions to intermediate calendar year conditions.

### **E.2.3 Engine Test Cell Operations**

When engines are removed from the aircraft for extensive maintenance, engine run-ups are performed in specialized engine test cells or outdoor test stands. NAS Lemoore is the current home base for most Navy F/A-18 aircraft on the West coast. Data for engine test cell operations at NAS Lemoore (Schubert 1997) was used to estimate test cell operating patterns for the new engines on the F/A-18E/F aircraft.

Tables E-34 through E-40 present estimated engine test cell emissions for the Phase 1 and Phase 2 squadron groupings used previously to summarize flight operation and in-frame engine run-up emissions. The extent of annual test cell use was estimated from current fuel use at the existing test cells and the test cell protocols used for the engines on the existing F/A-18C/D aircraft.

Table E-41 summarizes the types of test cycles currently conducted on F/A-18C/D aircraft engines at NAS Lemoore. More than half of the test events are relatively brief routine tests (schedule checks) that last about 14 minutes. Slightly less than half of all test events are much longer "break-in" tests. Existing F/A-18C/D aircraft use one of two slightly different engine models. Each engine model has a different test protocol for break-in testing.

Test cell protocols specific to the new engine used in F/A-18E/F aircraft were not available when this EIS was prepared. Consequently, test cycles used for the F/A-18C/D engines were used to estimate reasonable schedule check and break-in test cycles for the F/A-18E/F engine. Table E-42 presents the engine test cell cycles assumed for the analyses presented in this EIS.

Power settings used in engine test cells are often different than the power settings used for in-frame engine run-ups. Fuel use and emission factors for power settings used in engine test cells were obtained for the Navy's Aircraft Environmental Support Office (AESO). In a few cases, AESO did not have any data for a selected pollutants at specific power settings. In such cases, available data was extrapolated to provide reasonable estimates.

AESO did not have nitrogen oxide (NO<sub>x</sub>) emission rates for the flight idle setting on the F/A-18C/D engines. Emission rates and engine thrust values were used to extrapolate the missing flight idle NO<sub>x</sub> emission rate. AESO had only limited PM<sub>10</sub> emission rate data for the F/A-18C/D engines. Available emission rates and engine thrust values were used to extrapolate the missing PM<sub>10</sub> emission factors. The regression analysis results used for these extrapolations are presented graphically following Table E-43.

Although PM<sub>10</sub> emission testing has not yet been performed for the F/A-18E/F engine, AESO has extrapolated PM<sub>10</sub> emission factors to non-afterburner power settings (U.S. Navy 1997b). An afterburner PM<sub>10</sub> emission factor was extrapolated by estimating engine thrust for engine power settings and fuel flows (Table E-43), performing a curve fit of the available data, and then extrapolating to an estimated afterburner thrust setting. The regression analysis results used for this extrapolation are presented graphically following Table E-43.

Engine test cells generally require permits from local air pollution control districts, and thus are considered a stationary source excluded from general conformity analyses.

#### **E.2.4 Aircraft Support Equipment**

Aircraft operations generally require the use of some specialized ground support equipment. The most common equipment includes tow tractors and cargo lifters. Because the airfields for all alternatives have fixed point utility systems, mobile generators and air conditioning systems are used only infrequently to support flight operations. Analyses at other airfields (U.S. Navy 1997c) indicate that F/A-18 squadrons typically use one large tow tractor (for towing aircraft), one medium tow tractor (for towing equipment), and one hydraulic weapons loader. Table E-44 presents estimated emissions from ground support equipment that will be used by F/A-18 aircraft.

#### **E.2.5 Aircraft Refueling**

F/A-18 aircraft use JP-5 (jet kerosene) aircraft fuel. The E/F FIT team provided annual fuel use estimates for FRS and fleet squadrons. The FRS squadron will use about 11 million gallons of fuel per year. Each Phase 1 fleet squadron (14 aircraft) would use about 2.2 million gallons of fuel per year. By extrapolation, each Phase 2 fleet squadron (12 aircraft) would use about 1.9 million gallons of fuel per year.

Fuel handling and transfers will result in small quantities of evaporative emissions as liquid fuel displaces air and fuel vapors when fuel tanks are filled (U.S. Environmental Protection Agency 1995). As indicated in Table E-45, fuel transfer emissions vary with temperature. The emission rates indicated in Table E-45 assume splash loading of fuel tanks. The maximum emissions would occur if aircraft are refueled from fuel trucks rather than from fixed refueling systems.

When fuel trucks are used, two fuel transfers are required: filling the tank truck, and fueling the aircraft.

The two alternative receiving installations for the F/A-18E/F aircraft experience different seasonal temperature patterns (WeatherDisc Associates 1990). Monthly temperature patterns for NAS Lemoore and NAF El Centro are presented in Table E-60.

Refueling emission estimates for the NAS Lemoore Alternative (Tables E-46 through E-49) assume one month with an average temperature of 40 degrees Fahrenheit, four months with an average temperature of 50 degrees Fahrenheit, one month with an average temperature of 60 degrees Fahrenheit, four months with an average temperature of 70 degrees Fahrenheit, and two months with an average temperature of 80 degrees Fahrenheit.

Refueling emission estimates for the NAF El Centro Alternative (Tables E-50 through E-59) assume five months with an average temperature of 60 degrees Fahrenheit, one month with an average temperature of 70 degrees Fahrenheit, two months with an average temperature of 80 degrees Fahrenheit, and four months with an average temperature of 90 degrees Fahrenheit.

#### **E.2.6 Paint, Solvent, and Abrasive Use For Aircraft Maintenance**

Paints, solvents, and abrasive blasting media used for aircraft and engine maintenance activities will be additional minor sources of emissions associated with F/A-18E/F aircraft. Information was available from NAS Lemoore that provided generalized paint, solvent, and abrasive blast media use rates on a per-aircraft basis (Castro 1997b). Emission rate estimates (Table E-45) are based on typical solvent content for paints, 100% volatility for solvents, and 1% emissions for abrasive blast media.

Paint, solvent, and abrasive blast media emission estimates are presented in Tables E-46 through E-49 for the NAS Lemoore Alternative, and Tables E-50 through E-59 for the NAF El Centro Alternative. Aircraft and engine maintenance activities will generally occur in facilities subject to air pollution control district permit requirements. Thus, these emissions would generally be considered stationary source emissions excluded from conformity analyses.

#### **E.2.7 Miscellaneous Portable and Stationary Engines**

NAS Lemoore currently has 10 hydraulic test stands, 8 air start units, and 4 air conditioning carts to support 162 F/A-18 aircraft (Castro 1997a). These items are equipped with diesel engines, but are run on JP-5 fuel at NAS Lemoore. Data from NAS Lemoore (Castro 1997a, 1997b) indicate low use rates for this equipment (less than 10 hours per year per aircraft for the combination of equipment items).

Aircraft and engine maintenance activities and airfield operations are likely to make occasional use of portable and stationary engines for a variety of other purposes (generators, compressors, pumps, fans, etc.). No itemized inventory of such equipment was readily available from NAS Lemoore. Consequently, a generalized use estimate was made (Table E-45), assuming diesel-fueled engines operating at 50 horsepower load for 40 hours per year per aircraft (4 times the combined use rate of the large equipment fueled by JP-5).

Emission estimates for miscellaneous portable and stationary engine use are presented in Tables E-46 through E-49 for the NAS Lemoore Alternative, and Tables E-50 through E-59 for the NAF El Centro Alternative. Some of these equipment items may require permits from Air Pollution Control Districts, and thus could be excluded from conformity analyses. For purposes of this EIS, all such items have been treated as permit-exempt units that are included in the conformity analysis.

#### **E.2.8 Natural Gas Use for Space and Water Heating**

Space heating and water heating requirements for buildings generally will be met using natural gas as a heating fuel. Data from NAS Lemoore (Castro 1997a) indicate consistent sizes for boiler facilities used in hangars and BEQ/BOQ housing (Table E-45). Boilers in these size ranges require permits from air pollution control districts, and thus are stationary sources excluded from conformity analyses. Natural gas use for family housing, personnel support facilities, and general administrative space has been estimated using generic energy use assumptions derived from data in Hunn (1996).

Emission estimates for natural gas use are presented in Tables E-46 through E-49 for the NAS Lemoore Alternative, and Tables E-50 through E-59 for the NAF El Centro Alternative.

#### **E.2.9 Personal Vehicle Use**

Air pollutant emissions associated with personal vehicle travel were estimated by combining appropriate vehicle emission rates and travel pattern estimates. Travel pattern estimates were developed to reflect typical travel patterns for trips from on-base housing versus trips from off-base housing. Vehicle emission rates were calculated using the EMFAC7F vehicle emission rate model (California Air Resources Board 1992, 1993).

*The EMFAC Model.* EMFAC7F determines vehicle emission rates based on a wide range of factors: pollutants of interest; calendar year; air temperature; mix of vehicle types; vehicle operating mode conditions; average route speed; age distribution of vehicles by type; average annual mileage accumulations by vehicle age and type; basic exhaust emission rates for new vehicles by vehicle type and model year; deterioration rates for exhaust emissions by vehicle type and accumulated mileage; and the effectiveness of vehicle inspection and maintenance programs.

EMFAC7F is designed primarily for use in generating regional and statewide emission inventories rather than for performing project-specific analyses. The model is structured to use state-wide average default values for most input parameters. To provide flexibility for project-specific analyses, standardized EMFAC7F output files provided by the California Air Resources Board (CARB) were placed into a spreadsheet model that performs appropriate unit conversions and composite weightings while allowing the user to vary key parameters of interest. Lookup table data in the spreadsheet version of EMFAC7F are based on 5 mph speed increments and 10 degree temperature increments.

The EMFAC7F program recognizes three operating mode conditions for gasoline-fueled passenger vehicles. These operating modes (cold start, hot start, and hot stabilized) are a function of four factors: how long a vehicle's engine has been on; how long the vehicle was parked before the engine was started; the operating mode condition of the vehicle at the time it was previously parked; and whether the vehicle has a catalytic converter. Vehicles operating in a cold start mode have significantly higher emission rates than those operating in hot start or hot stabilized modes.

*Vehicle Operating Modes.* Vehicle operating mode definitions reflect the conditions of standardized test procedures used to certify that new vehicles meet applicable federal and state emission standards. By definition, the hot stabilized mode represents all vehicle operations occurring after the engine has been on for 505 seconds. The first 505 seconds of vehicle operation will be in either a cold start or a hot start mode. Cold start and hot start operating modes are distinguished by three factors: the operating mode condition of the vehicle when parked; the duration of parking preceding vehicle start-up; and the presence or absence of a catalytic converter.

Vehicles with a catalytic converter will resume operations in a cold start mode after the engine has been off for 1 hour or more. Vehicles without a catalytic converter resume operations in a cold start mode after the engine has been off for 4 hours or more. Any vehicle which is still in a cold start mode when parked will resume operations in a cold start mode regardless of the parking duration.

If a catalyst-equipped vehicle is parked for less than 1 hour, it will resume operations in a hot start mode (unless the vehicle was still in a cold start mode when it parked). If a noncatalyst vehicle is parked for a period of less than 4 hours, it will resume operations in a hot start mode.

Parking duration patterns vary by trip purpose. Work trips often begin in a cold start mode and end with a long parking duration. Shopping trips are more likely to begin in a hot start mode and end with a short or intermediate parking duration. Typical cold start and hot start patterns by trip type have been developed by the California Department of Transportation (Caltrans) using data

from statewide travel pattern surveys (California Department of Transportation 1981).

Average vehicle operating mode conditions can be calculated directly from a known or assumed travel time distribution. Travel time distribution assumptions are most easily established by separating overall vehicle travel into trip purpose categories that can be associated with residential and nonresidential land use categories. Three trip categories (home-work trips, home-shopping trips, home-other trips) are normally used for residential land uses. Two additional trip categories (other-work and other-other) are typically added for nonresidential land uses.

*Travel Patterns.* The analyses used for this EIS were developed separately for on-base and off-base housing. Travel patterns associated with off-base housing were evaluated in greater detail than those associated with on-base housing.

A single generic travel time distribution pattern was used for on-base housing at each alternative (Table E-61). Vehicle emission rates for trips from on-base housing were prepared separately for each alternative, since summer temperature patterns differ significantly among the alternative receiving installation. Differences in diurnal temperature patterns affect both exhaust and evaporative emissions from motor vehicles. EMFAC7F input assumptions and resulting emission rates for trips from on-base housing are presented in Tables E-62 and E-63 for the NAS Lemoore Alternative, and in Tables E-64 and E-65 for the NAF El Centro Alternative.

Separate travel time distribution patterns were developed for trips associated with off-base housing for each alternative (Tables E-66, and E-67). The travel time patterns were developed by considering areawide land use patterns and highway systems. The mean work trip travel times produced by this analysis are somewhat shorter than the average commute times presented in published summaries of travel survey data (U.S. Federal Highway Administration 1985; California Department of Transportation 1992). EMFAC7F input assumptions and resulting emission rates for trips from off-base housing are presented in Tables E-68 and E-69 for the NAS Lemoore Alternative, and in Tables E-70 and E-71 for the NAF El Centro Alternative.

*Emission Estimates.* Travel time distributions and associated vehicle emission factors were converted into overall emission estimates by establishing vehicle trip generation rates and vehicle speed distribution patterns by trip purpose and on-base versus off-base housing situation. Different speed distributions were used at each alternative receiving installation for work trips from on-base housing, thus converting the generic travel time pattern into different average trip distance values.

Table E-72 summarizes the trip generation rates used for the NAS Lemoore Alternative. Consistent with traffic analyses prepared for this EIS, trip generation rates for military personnel are lower than the rates typically used for residential development projects. Table E-73 summarizes the partitioning of trip generation rates into trip purpose categories. Table E-73 also identifies the average trip durations and speed distributions assumed for the different trip purpose categories. Table E-74 provides a summary of weekday trip generation, vehicle miles traveled, and vehicle emissions for the NAS Lemoore Alternative. Vehicle emissions have been separated into two components: emissions associated with base-related travel (work-related travel), and emissions associated with other household travel (shopping and other travel). Base-related emissions are included in conformity analyses. There would be no additional personnel or vehicle travel associated with Phase 2 conditions for the NAS Lemoore Alternative, because they are replacements of existing squadrons.

Table E-75 summarizes the trip generation rates used for Phase 1 of the NAF El Centro Alternative. Table E-76 summarizes the partitioning of Phase 1 trip generation rates into trip purpose categories. Table E-76 also identifies the average trip durations and speed distributions assumed for the different trip purpose categories. Table E-77 provides a summary of weekday trip generation, vehicle miles traveled, and vehicle emissions for Phase 1 of the NAF El Centro Alternative.

Table E-78 summarizes the trip generation rates used for Phase 2 of the NAF El Centro Alternative. Table E-79 summarizes the partitioning of Phase 2 trip generation rates into trip purpose categories. Table E-79 also identifies the average trip durations and speed distributions assumed for the different trip purpose categories. Table E-80 provides a summary of weekday trip generation, vehicle miles traveled, and vehicle emissions for Phase 2 of the NAF El Centro Alternative.

The EMFAC7F model does not estimate sulfur oxide emissions from motor vehicles. Sulfur oxide emissions have been estimated using a generalized emission factor of 0.03 grams per vehicle-mile (Bay Area Air Quality Management District 1996).

### **E.3 CLEAN AIR ACT CONFORMITY REQUIREMENTS**

#### **E.3.1 Introduction**

Section 176(c) of the Clean Air Act requires that federal agency actions be consistent with the Clean Air Act and with any approved air quality management plan (state implementation plan [SIP]). EPA adopted Clean Air Act conformity requirements in two stages: one rule for regional transportation plans, highway projects, and transit projects; and a second rule for other federal agency actions.

The conformity rule for highway and mass transit plans and projects was promulgated in the November 24, 1993 Federal Register (58 FR 62188-62216). The transportation conformity rule (40 CFR Part 93 Subpart A; duplicated in 40 CFR Part 51 Subpart T) applies to transportation plans and transportation projects that require action by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA) under Title 23 U.S.C. or the Federal Transit Act. The transportation conformity rule defines a "transportation project" as a highway project or mass transit project. Federal agency actions affecting airports, harbors, or freight rail facilities would normally be subject to the general conformity rule, not the transportation conformity rule.

The conformity rule for general federal actions was promulgated in the November 30, 1993 Federal Register (58 FR 63214-63259), and became effective on January 31, 1994. The Navy's proposed action is subject to the general conformity rule (40 CFR Part 93 Subpart B; duplicated in 40 CFR Part 51 Subpart W). Most air pollution control districts have adopted the EPA conformity rules verbatim, often by direct reference to the relevant 40 CFR parts. San Joaquin Valley Unified Pollution Control District Rule 9110 adopts the EPA general conformity rule by reference to 40 CFR Part 51 Subpart W.

#### **E.3.2 Purpose of the General Conformity Rule**

The EPA general conformity rule requires federal agencies to analyze proposed actions according to standardized procedures and to provide a public review and comment process. The conformity determination process is intended to demonstrate that the proposed federal action:

- is consistent with the appropriate SIP;
- will not cause or contribute to new violations of federal air quality standards;
- will not increase the frequency or severity of existing violations of federal air quality standards; and
- will not delay the timely attainment of federal air quality standards.

#### **E.3.3 Applicability of the General Conformity Rule**

The EPA general conformity rule applies to general federal actions affecting nonattainment areas and to designated maintenance areas (attainment areas that were previously designated as nonattainment areas). As noted previously, highway or mass transit projects that require FHWA or FTA funding or approval will be subject to transportation conformity rule requirements rather than the EPA general conformity rule requirements. Analyses required by the general conformity rule must be performed for each nonattainment or maintenance pollutant and its relevant precursors.

Five categories of actions and projects are excluded from the general conformity rule requirements (40 CFR 93.153(d)):

- stationary sources requiring new source review (NSR) or prevention of significant deterioration (PSD) permits;
- direct emissions from remedial actions at Superfund (CERCLA) sites when the substantive requirements of NSR/PSD programs are met or when the action is otherwise exempted under provisions of CERCLA;
- initial and continuing actions in response to emergencies or disasters;
- alterations and additions to existing structures as specifically required by applicable environmental legislation or regulations; and
- various special studies and research investigation actions.

Conformity determinations are not required to address the emissions consequences of those portions of an action that are not reasonably foreseeable or are not quantifiable.

In addition, conformity determinations are not required when the annual direct and indirect emissions from the action will be less than the applicable de minimis thresholds (40 CFR 93.153(c)). Applicable de minimis levels vary by pollutant and the severity of nonattainment conditions (40 CFR 93.153(b)). The de minimis thresholds in carbon monoxide, sulfur dioxide, or nitrogen dioxide nonattainment areas are 100 tons per year of the relevant pollutant. The de minimis threshold in lead nonattainment areas is 25 tons per year.

The de minimis threshold in ozone nonattainment areas generally applies to both organic compound and nitrogen oxide emissions. The de minimis level varies according to severity of nonattainment: 100 tons per year in marginal or moderate nonattainment areas, 50 tons per year in serious nonattainment areas, 25 tons per year in severe nonattainment areas, and 10 tons per year in extreme nonattainment areas.

The de minimis threshold in PM<sub>10</sub> nonattainment areas applies to identified PM<sub>10</sub> precursors as well as to directly emitted PM<sub>10</sub>. The de minimis level is 100 tons per year in moderate nonattainment areas and 70 tons per year in severe nonattainment areas.

The EPA conformity rule identifies several categories of actions that are presumed to result in no net emissions increase or in an emissions increase that will clearly be less than any applicable de minimis level. These types of activities are primarily routine administrative, planning, financial, property disposal, or property maintenance actions.

Regardless of the applicable de minimis level, conformity assessments are required for non-exempt "regionally significant" actions: direct and indirect emissions exceed 10% of the applicable SIP emissions inventory, regardless of numerical value.

Emission estimates summarized in Chapter 4 of the EIS and documented in subsequent sections of this appendix demonstrate that Clean Air Act conformity determination requirements apply to both the NAS Lemoore and NAF El Centro alternatives.

#### **E.3.4 Responsibility for Conformity Determinations**

The federal agency undertaking the action is responsible for preparing and issuing the conformity determination under the EPA conformity rules. Other federal, state, and local agencies have review and comment responsibility.

#### **E.3.5 Options for Demonstrating Conformity**

Two types of technical analyses can be used to demonstrate clean air act conformity:

- dispersion modeling demonstrations for primary (i.e., directly emitted) pollutants to show that there will be no violations of federal ambient air quality standards; or
- emissions analyses that demonstrate that there will be no net emissions increase and that emissions will not interfere with the timely attainment and maintenance of federal ambient air quality standards.

Dispersion modeling demonstrations of conformity are not allowed for ozone nonattainment areas, and will seldom be feasible for other secondary pollutants (nitrogen dioxide and particulate matter). In addition, modeling may not be possible for some types of emission sources due to the lack of appropriate dispersion models. In general, dispersion modeling is most useful for carbon monoxide, lead, and sulfur dioxide nonattainment areas. Dispersion modeling may be useful in some PM<sub>10</sub> nonattainment areas if secondary PM<sub>10</sub> is not a significant contributor to nonattainment conditions.

If dispersion modeling is not used for the conformity demonstration, then the conformity demonstration requires either consistency with emission forecasts in SIP documents or identification of concurrent or prior emission reductions that will compensate for emission increases associated with a proposed action.

If EPA has not yet approved a SIP document submitted pursuant to the Clean Air Act Amendments of 1990, there are two basic options for demonstrating conformity.

- Conformity will be demonstrated if direct and indirect emissions from the action are fully offset through compensating emission reductions implemented through a federally enforceable mechanism (40 CFR 93.158(a)(2); 40 CFR 58.858(a)(2)).
- Alternatively, conformity can be demonstrated by showing that total direct and indirect emissions with the federal action do not exceed estimated future baseline scenario emissions. Future baseline scenario emissions are total direct and indirect emissions that would occur in future years if baseline (1990 or the nonattainment designation year) emission source activity levels remain constant in the geographic area affected by the federal action. The future baseline scenario represents a "no action" scenario projected to the maximum emissions year for the proposed action, to the attainment year mandated by the Clean Air Act, and to any other "milestone" years identified in the existing SIP (40 CFR 93.158(a)(5)(iv)(A); 40 CFR 58.858(a)(5)(iv)(A)).

If EPA has approved SIP revisions pursuant to the 1990 Clean Air Act Amendments, any one of several options can be used for demonstrating conformity.

- Conformity is presumed if direct and indirect emissions from the activity are specifically identified and accounted for in the attainment or maintenance demonstration of a SIP approved after 1990 (40 CFR 93.158(a)(1); 40 CFR 58.858(a)(1)).
- Conformity will be demonstrated if direct and indirect emissions from the action are fully offset through compensating emission reductions implemented through a federally enforceable mechanism (40 CFR 93.158(a)(2) and 40 CFR 93.158(a)(5)(iii); 40 CFR 58.858(a)(2) and 40 CFR 58.858(a)(5)(iii)).
- Conformity also can be demonstrated if the agency responsible for SIP preparation provides documentation that direct and indirect emissions associated with the federal agency action are accommodated within the emission forecasts contained in an approved SIP (40 CFR 93.158(a)(5)(i)(A); 40 CFR 58.858(a)(5)(i)(A)).
- Finally, if SIP conformity cannot be demonstrated by the procedures noted above, a conformity determination is possible only if the relevant air quality management agency notifies EPA that appropriate changes will be made in the applicable SIP documents. The air quality management agency must commit to a schedule for preparing an acceptable SIP amendment that accommodates the net increase in direct and indirect emissions from the federal action without causing

any delay in the schedule for attaining the relevant federal ambient air quality standard (40 CFR 93.158(a)(5)(i)(B); 40 CFR 58.858(a)(5)(i)(B)).

All conformity determinations must also demonstrate that total direct and indirect emissions are consistent with all relevant requirements and milestones in the applicable SIP including:

- reasonable further progress schedules,
- assumptions specified in the attainment or maintenance demonstration, and
- SIP prohibitions, numerical emission limits, and work practice requirements.

#### **E.4 DRAFT CLEAN AIR ACT CONFORMITY DETERMINATION, FACILITIES TO SUPPORT U.S. PACIFIC FLEET F/A-18E/F AIRCRAFT AT NAS LEMOORE**

##### **E.4.1 Applicability Analysis**

NAS Lemoore straddles the boundary between Fresno and Kings Counties, California. Both Fresno County and Kings County are part of the San Joaquin Valley Air Basin. The San Joaquin Valley Air Basin is designated a severe ozone nonattainment area and a severe PM<sub>10</sub> nonattainment area. As indicated subsequently in Table E-85, direct and indirect emissions of ozone and PM<sub>10</sub> precursors associated with the proposed action exceed the de minimis thresholds of 50 tons per year for ozone precursors and 70 tons per year for PM<sub>10</sub>. Consequently, Clean Air Act conformity determination requirements apply to development of facilities to support F/A-18E/F aircraft at NAS Lemoore.

Some emission sources associated with the proposed action are exempt from consideration under the general conformity rule. Exempt emission sources include stationary sources that require permits from the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD), and are therefore subject to the agency's new source review program, and emission sources that are not under Navy control.

Various new facilities would be needed at NAS Lemoore to support the F/A-18E/F squadrons. Some of these facilities would include equipment that would require air quality permits from the SJVUAPCD. Facilities and equipment covered by new, existing, or amended, SJVUAPCD permits are exempt from consideration in a conformity determination. Examples of emission sources that are exempt from consideration in a conformity determination include engine test cells; boilers used for space heating and water heating; and various painting, degreasing, and abrasive blasting facilities used for aircraft and engine maintenance.

Some portable equipment associated with aircraft maintenance activities plus some equipment associated with aircraft flight operations may be subject to SJVUAPCD permit requirements. For some of this equipment, the Navy has the option of registering the equipment as a mobile source instead of having it permitted as a stationary source. For purposes of this conformity determination, all such equipment has been treated as permit-exempt mobile source equipment, and included in the conformity analysis.

Vehicle travel associated with added military and civilian personnel has been separated into base-related travel (work-related trips) and other household travel (shopping and other nonwork trips). Emissions associated with base-related travel are included in the conformity analysis. Emissions associated with off-base housing units (space heating, water heating, etc.) are not under Navy control, and are excluded from the conformity analysis.

#### **E.4.2 Summary of Added Emissions**

Conformity-related emission estimates for the F/A-18E/F action are summarized in Table E-85. The maximum annual conformity-related emissions will be 306.20 tons per year of reactive organic compounds, 306.74 tons per year of nitrogen oxides, and 163.68 tons per year of PM<sub>10</sub>. These emission increases exceed the relevant *de minimis* levels for the San Joaquin Valley (50 tons per year for reactive organic compounds and nitrogen oxides, 70 tons per year for PM<sub>10</sub>). Consequently, the conformity determination for facilities to support F/A-18E/F aircraft basing at NAS Lemoore needs to address both ozone and PM<sub>10</sub> emissions.

#### **E.4.3 Options for Demonstrating Conformity with the Ozone and PM<sub>10</sub> Sips for The San Joaquin Valley**

The Record of Decision for the recent closure of Castle Air Force Base transferred conformity-related emission offsets to NAS Lemoore in the amounts of 100 tons per year for reactive organic compounds, 367.1 tons per year for nitrogen oxides, and 151.6 tons per year for PM<sub>10</sub>. The transferred emission offset quantities are insufficient to compensate for the anticipated increases in reactive organic compound and PM<sub>10</sub> emissions, but exceed the anticipated increase in nitrogen oxide emissions. The Navy needs to address a deficiency of 206.20 tons per year in reactive organic compound emissions and 12.08 tons per year in PM<sub>10</sub> emissions.

The SJVUPACD recognizes reactive organic compounds and nitrogen oxides as ozone precursors. In addition, the SJVUAPCD recognizes reactive organic compounds and nitrogen oxides as PM<sub>10</sub> precursors. The SJVUAPCD has supported interpollutant compensation among ozone and PM<sub>10</sub> precursors for purposes of demonstrating Clean Air Act conformity. Thus, the surplus of 60.4 tons per year in nitrogen oxide conformity offsets obtained with the closure of Castle Air Force Base can help offset the reactive organic compound and PM<sub>10</sub> emissions and airfield operations are likely to make occasional use of portable and stationary engines for a variety of other purposes (generators, compressors,

conformity offset surplus to compensate for the  $PM_{10}$  deficiency, there remains a net deficiency of 157.92 tons per year for ozone precursors.

The conformity-related deficit of 157.92 tons per year in ozone precursor emissions can be remedied in any of three ways:

- by the Navy obtaining a sufficient quantity of additional conformity-related reactive organic compound or nitrogen oxide offsets generated by the closure of Castle Air Force Base;
- by the Navy obtaining a commitment from the SJVUAPCD to modify the ozone and  $PM_{10}$  SIPs to specifically account for the F/A-18E/F action at NAS Lemoore; or
- by the Navy obtaining a sufficient quantity of additional ozone precursor emission offsets from other on-base or off-base sources.

#### E.4.4 Statement of Conformity

Maximum conformity-related emissions increases associated with facilities to support F/A-18E/F aircraft at NAS Lemoore amount to 306.20 tons per year of reactive organic compounds, 306.74 tons per year of nitrogen oxides, and 163.68 tons per year of  $PM_{10}$ . These conformity-related emissions have been partially compensated by mobile source emission offsets previously obtained by NAS Lemoore during the closure of Castle Air Force Base. The remaining pollutant-specific deficiencies and surpluses are: a deficiency of 206.20 tons per year for reactive organic compounds; a surplus of 60.36 tons per year for nitrogen oxides; and a deficiency of 12.08 tons per year for  $PM_{10}$ .

The SJVUAPCD recognizes interpollutant trading for purposes of demonstrating Clean Air Act conformity. Nitrogen oxides are recognized by the SJVUAPCD as both ozone and  $PM_{10}$  precursors. Thus, the conformity offsets previously obtained during the closure of Castle Air Force Base leave an uncompensated ozone precursor deficit of 157.92 tons per year. This conformity-related ozone precursor deficit will be addressed by:

- by the Navy obtaining a sufficient quantity of additional conformity-related reactive organic compound or nitrogen oxide offsets generated by the closure of Castle Air Force Base;
- by the Navy obtaining a commitment from the SJVUAPCD to modify the ozone and  $PM_{10}$  SIPs to specifically account for the F/A-18E/F action at NAS Lemoore; or
- by the Navy obtaining a sufficient quantity of additional ozone precursor emission offsets from other on-base or off-base sources.

NAS Lemoore will follow SJVUAPCD procedures to ensure that new, relocated, or modified facilities and equipment meet applicable rules and regulations (including all SIP requirements) prior to facility construction or installation.

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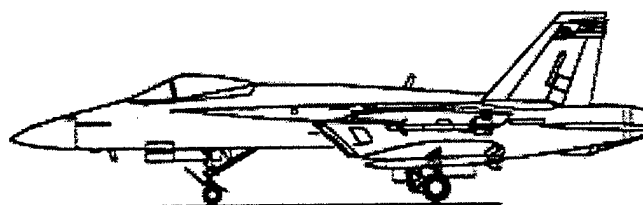
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## CONSTRUCTION EMISSIONS ANALYSIS

TABLE E-1. ESTIMATED CONSTRUCTION SITE ACREAGES FOR NAS LEMOORE ALTERNATIVE

ALTERNATIVE	FACILITY	FACILITY SQ FT or PERSONNEL	DISTURBED SITE MULTIPLIER	GROSS SITE ACRES	YEAR
NAS LEMOORE	NAMTRA	24,006	1.25	0.69	1999
	WEAPONS SCHOOL	6,943	1.5	0.24	1999
	ENGINE SHOP	12,003	1.5	0.41	1999
	ARMAMENT SHOP	45,008	1.5	1.55	1999
	BEQ	358	820	6.74	1999
	FAMILY HOUSING	100	4800	11.02	1999
	-----	-----		-----	-----
	1999 SUBTOTAL	281,350	sq ft	20.65	1999
	CHILD CENTER	17,224	2	0.79	2000
	YOUTH CENTER	8,451	2	0.39	2000
	FAMILY HOUSING	100	4800	11.02	2000
	-----	-----		-----	-----
	2000 SUBTOTAL	145,675	sq ft	12.20	2000
	FAMILY HOUSING	100	4800	11.02	2001
	COUNSELING CENTER	15,900	1.5	0.55	2001
	-----	-----		-----	-----
	2001 SUBTOTAL	135,900	sq ft	11.57	2001
	FAMILY HOUSING	99	4800	10.91	2002
	-----	-----		-----	-----
	2002 SUBTOTAL	118,800	sq ft	10.91	2002

Notes: The disturbed site multiplier converts facility size into the an approximate construction site size (in square feet), including allowances for landscaping and parking.

BEQ and BOQ facilities are assumed to be multiple story buildings.

TABLE E-2. CONSTRUCTION ASSUMPTIONS FOR 1999 PROJECTS, NAS LEMOORE ALTERNATIVE

FUGITIVE DUST DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
PM10 portion of fugitive TSP	==>	35%	35%
area subject to surface disturbance	==>	21 acres	14 acres
typical area disturbed on any one day	==>	21 acres	14 acres
duration of activity phase on any area	==>	45 days	120 days
dust control program effectiveness	==>	65%	65%
Nominal Construction Period by Phase:		45 days	120 days
Nominal Overall Construction Period:		165 days	
CONSTRUCTION VEHICLE DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
		Number of Vehicles	Hours per Day
		-----	-----
track-type tractor	==>		
wheeled tractor	==>		2 4
cold planers and wheeled dozers	==>	4 6	
scraper	==>	4 6	
motor grader	==>	2 4	
wheeled loader	==>	6 6	2 4
track-type loader	==>		
off-highway truck	==>	6 6	6 4
static and vibratory rollers	==>		2 4
excavators/crawlers, trenchers	==>	4 4	
concrete pavers, asphalt pavers	==>		2 6
cranes and miscellaneous equipment	==>		4 4
Total Number of Construction Vehicles:		26	18
Construction Equipment Fuel Use Estimate, gallons/day:		1,534	563
Mean Fuel Consumption Rate, gallons/vehicle-hour:		10.7	7.4
Cumulative Hours of Heavy Equipment Use:		6,480	9,120
Total Cumulative Hours of Heavy Equipment Use:		15,600	

Notes: The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly clay loams).  
Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.  
Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.  
Dust control program effectiveness assumes implementation of comprehensive fugitive dust control practices.

TABLE E-3. 1999 CONSTRUCTION SEASON EMISSIONS SUMMARY, NAS LEMOORE ALTERNATIVE

Construction Phase	Construction Period Emissions (tons)				
	ROG	NOx	CO	SOx	PM10
Site Preparation Emissions	0.7	10.0	3.8	1.0	5.3
Facility Construction Emissions	0.8	10.8	5.9	1.1	9.0
Total Construction Period Emissions	1.4	20.7	9.7	2.1	14.4
Nonimal Site and Foundation Preparation Period: 45 days					
Nominal Facility Construction Period: 120 days					
Nominal Acre-Days for Site and Foundation Preparation: 945 acre-days					
Nominal Acre-Days for Facility Construction: 1,680 acre-days					
Equipment Use for Site and Foundation Preparation: 6,480 vehicle-hours					
Equipment Use for Facility Construction: 9,120 vehicle-hours					
Normalized Equipment Use, Site & Foundation Preparation: 6.86 hours/acre-day					
Normalized Equipment Use, Facility Construction: 5.43 hours/acre-day					

Notes: ROG = reactive organic compounds  
 NOx = oxides of nitrogen  
 CO = carbon monoxide  
 PM10 = inhalable particulate matter  
 SOx = sulfur oxides

The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly clay loams).  
 Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.  
 Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.  
 Dust control program effectiveness assumes implementation of comprehensive fugitive dust control practices.

Data Sources: Emission rate data and procedures from U.S. Environmental Protection Agency 1985 (AP-42, Volume II, Section II-7) and U.S. Environmental Protection Agency 1995 (AP-42, Volume I, Section 13.2.3).  
 Diesel vehicle exhaust TOG emission rates converted to ROG emission rates using 97.58% factor obtained from California Air Resources Board.

TABLE E-4. CONSTRUCTION ASSUMPTIONS FOR 2000 PROJECTS, NAS LEMOORE ALTERNATIVE

FUGITIVE DUST DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
PM10 portion of fugitive TSP	==>	35%	35%
area subject to surface disturbance	==>	12 acres	9 acres
typical area disturbed on any one day	==>	12 acres	9 acres
duration of activity phase on any area	==>	45 days	105 days
dust control program effectiveness	==>	65%	65%
Nominal Construction Period by Phase:		45 days	105 days
Nominal Overall Construction Period:		150 days	
CONSTRUCTION VEHICLE DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
		Number of Vehicles	Hours per Day
		-----	-----
track-type tractor	==>		
wheeled tractor	==>		2 4
cold planers and wheeled dozers	==>	2 6	
scraper	==>	2 6	
motor grader	==>	2 4	
wheeled loader	==>	4 6	2 4
track-type loader	==>		
off-highway truck	==>	5 6	4 4
static and vibratory rollers	==>		1 4
excavators/crawlers, trenchers	==>	3 4	
concrete pavers, asphalt pavers	==>		1 6
cranes and miscellaneous equipment	==>		2 4
Total Number of Construction Vehicles:		18	12
Construction Equipment Fuel Use Estimate, gallons/day:		1,006	375
Mean Fuel Consumption Rate, gallons/vehicle-hour:		10.3	7.5
Cumulative Hours of Heavy Equipment Use:		4,410	5,250
Total Cumulative Hours of Heavy Equipment Use:		9,660	

Notes: The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly clay loams).  
Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.  
Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.  
Dust control program effectiveness assumes implementation of comprehensive fugitive dust control practices.

TABLE E-5. 2000 CONSTRUCTION SEASON EMISSIONS SUMMARY, NAS LEMOORE ALTERNATIVE

Construction Phase	Construction Period Emissions (tons)				
	ROG	NOx	CO	SOx	PM10
Site Preparation Emissions	0.4	6.6	2.6	0.7	3.1
Facility Construction Emissions	0.5	6.3	3.8	0.6	5.1
Total Construction Period Emissions	0.9	12.8	6.4	1.3	8.2
Nominal Site and Foundation Preparation Period: 45 days					
Nominal Facility Construction Period: 105 days					
Nominal Acre-Days for Site and Foundation Preparation: 540 acre-days					
Nominal Acre-Days for Facility Construction: 945 acre-days					
Equipment Use for Site and Foundation Preparation: 4,410 vehicle-hours					
Equipment Use for Facility Construction: 5,250 vehicle-hours					
Normalized Equipment Use, Site & Foundation Preparation: 8.17 hours/acre-day					
Normalized Equipment Use, Facility Construction: 5.56 hours/acre-day					

Notes: ROG = reactive organic compounds  
 NOx = oxides of nitrogen  
 CO = carbon monoxide  
 PM10 = inhalable particulate matter  
 SOx = sulfur oxides

The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly clay loams).  
 Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.  
 Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.  
 Dust control program effectiveness assumes implementation of comprehensive fugitive dust control practices.

Data Source: Emission rate data and procedures from U.S. Environmental Protection Agency 1985 (AP-42, Volume II, Section II-7) and U.S. Environmental Protection Agency 1995 (AP-42, Volume I, Section 13.2.3).  
 Diesel vehicle exhaust TOG emission rates converted to ROG emission rates using 97.58% factor obtained from California Air Resources Board.

TABLE E-6. CONSTRUCTION ASSUMPTIONS FOR 2001 PROJECTS, NAS LEMOORE ALTERNATIVE

FUGITIVE DUST DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
PM10 portion of fugitive TSP	==>	35%	35%
area subject to surface disturbance	==>	12 acres	8 acres
typical area disturbed on any one day	==>	12 acres	8 acres
duration of activity phase on any area	==>	45 days	105 days
dust control program effectiveness	==>	65%	65%
Nominal Construction Period by Phase:		45 days	105 days
Nominal Overall Construction Period:		150 days	
CONSTRUCTION VEHICLE DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
		Number of Vehicles	Hours per Day
		-----	-----
track-type tractor	==>		
wheeled tractor	==>		1 4
cold planers and wheeled dozers	==>	2 6	
scraper	==>	2 6	
motor grader	==>	2 4	
wheeled loader	==>	4 6	2 4
track-type loader	==>		
off-highway truck	==>	5 6	4 4
static and vibratory rollers	==>		1 4
excavators/crawlers, trenchers	==>	3 4	
concrete pavers, asphalt pavers	==>		1 4
cranes and miscellaneous equipment	==>		2 4
Total Number of Construction Vehicles:		18	11
Construction Equipment Fuel Use Estimate, gallons/day:		1,006	354
Mean Fuel Consumption Rate, gallons/vehicle-hour:		10.3	8.0
Cumulative Hours of Heavy Equipment Use:		4,410	4,620
Total Cumulative Hours of Heavy Equipment Use:			9,030

Notes: The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly clay loams).  
Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.  
Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.  
Dust control program effectiveness assumes implementation of comprehensive fugitive dust control practices.

TABLE E-7. 2001 CONSTRUCTION SEASON EMISSIONS SUMMARY, NAS LEMOORE ALTERNATIVE

Construction Phase	Construction Period Emissions (tons)				
	ROG	NOx	CO	SOx	PM10
Site Preparation Emissions	0.4	6.6	2.6	0.7	3.1
Facility Construction Emissions	0.4	5.8	3.0	0.6	4.5
Total Construction Period Emissions	0.8	12.4	5.6	1.3	7.6
Nominal Site and Foundation Preparation Period: 45 days					
Nominal Facility Construction Period: 105 days					
Nominal Acre-Days for Site and Foundation Preparation: 540 acre-days					
Nominal Acre-Days for Facility Construction: 840 acre-days					
Equipment Use for Site and Foundation Preparation: 4,410 vehicle-hours					
Equipment Use for Facility Construction: 4,620 vehicle-hours					
Normalized Equipment Use, Site & Foundation Preparation: 8.17 hours/acre-day					
Normalized Equipment Use, Facility Construction: 5.50 hours/acre-day					

Notes: ROG = reactive organic compounds  
 NOx = oxides of nitrogen  
 CO = carbon monoxide  
 PM10 = inhalable particulate matter  
 SOx = sulfur oxides

The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly clay loams).  
 Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.  
 Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.  
 Dust control program effectiveness assumes implementation of comprehensive fugitive dust control practices.

Data Source: Emission rate data and procedures from U.S. Environmental Protection Agency 1985 (AP-42, Volume II, Section II-7) and U.S. Environmental Protection Agency 1995 (AP-42, Volume I, Section 13.2.3).  
 Diesel vehicle exhaust TOG emission rates converted to ROG emission rates using 97.58% factor obtained from California Air Resources Board.

TABLE E-8. CONSTRUCTION ASSUMPTIONS FOR 2002 PROJECTS, NAS LEMOORE ALTERNATIVE

FUGITIVE DUST DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
PM10 portion of fugitive TSP	==>	35%	35%
area subject to surface disturbance	==>	11 acres	8 acres
typical area disturbed on any one day	==>	11 acres	8 acres
duration of activity phase on any area	==>	45 days	105 days
dust control program effectiveness	==>	65%	65%
Nominal Construction Period by Phase:		45 days	105 days
Nominal Overall Construction Period:		150 days	
CONSTRUCTION VEHICLE DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
		Number of Vehicles	Hours per Day
		-----	-----
track-type tractor	==>		
wheeled tractor	==>		1 4
cold planers and wheeled dozers	==>	2 6	
scraper	==>	2 6	
motor grader	==>	2 4	
wheeled loader	==>	3 6	2 4
track-type loader	==>		
off-highway truck	==>	4 6	4 4
static and vibratory rollers	==>		1 4
excavators/crawlers, trenchers	==>	3 4	
concrete pavers, asphalt pavers	==>		1 4
cranes and miscellaneous equipment	==>		2 4
Total Number of Construction Vehicles:		16	11
Construction Equipment Fuel Use Estimate, gallons/day:		884	354
Mean Fuel Consumption Rate, gallons/vehicle-hour:		10.3	8.0
Cumulative Hours of Heavy Equipment Use:		3,870	4,620
Total Cumulative Hours of Heavy Equipment Use:		8,490	

Notes: The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly clay loams).  
Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.  
Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.  
Dust control program effectiveness assumes implementation of comprehensive fugitive dust control practices.

TABLE E-9. 2002 CONSTRUCTION SEASON EMISSIONS SUMMARY, NAS LEMOORE ALTERNATIVE

Construction Phase	Construction Period Emissions (tons)				
	ROG	NOx	CO	SOx	PM10
Site Preparation Emissions	0.4	5.8	2.2	0.6	2.8
Facility Construction Emissions	0.4	5.8	3.0	0.6	4.5
Total Construction Period Emissions	0.8	11.6	5.2	1.2	7.4
Nonimal Site and Foundation Preparation Period: 45 days					
Nominal Facility Construction Period: 105 days					
Nominal Acre-Days for Site and Foundation Preparation: 495 acre-days					
Nominal Acre-Days for Facility Construction: 840 acre-days					
Equipment Use for Site and Foundation Preparation: 3,870 vehicle-hours					
Equipment Use for Facility Construction: 4,620 vehicle-hours					
Normalized Equipment Use, Site & Foundation Preparation: 7.82 hours/acre-day					
Normalized Equipment Use, Facility Construction: 5.50 hours/acre-day					

Notes: ROG = reactive organic compounds  
 NOx = oxides of nitrogen  
 CO = carbon monoxide  
 PM10 = inhalable particulate matter  
 SOx = sulfur oxides

The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly clay loams).  
 Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.  
 Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.  
 Dust control program effectiveness assumes implementation of comprehensive fugitive dust control practices.

Data Source: Emission rate data and procedures from U.S. Environmental Protection Agency 1985 (AP-42, Volume II, Section II-7) and U.S. Environmental Protection Agency 1995 (AP-42, Volume I, Section 13.2.3).  
 Diesel vehicle exhaust TOG emission rates converted to ROG emission rates using 97.58% factor obtained from California Air Resources Board.

TABLE E-10. ESTIMATED CONSTRUCTION SITE ACREAGES FOR NAF EL CENTRO ALTERNATIVE

ALTERNATIVE	FACILITY	FACILITY SQ FT or PERSONNEL	DISTURBED SITE MULTIPLIER	GROSS SITE ACRES	YEAR
NAF EL CENTRO	RUNWAY 2	1,800,000	1.1	45.45	1999
	TAXIWAYS	112,500	1.1	2.84	1999
	FRS HANGAR	78,420	1.25	2.25	1999
	NAMTRA	20,400	1.25	0.59	1999
	WEAPONS SCHOOL	11,875	1.25	0.34	1999
	FLIGHT SIMULATOR	600	1.25	0.02	1999
	SQUADRON HANGAR	27,957	1.25	0.80	1999
	ENGINE TEST CELL	5,950	1.5	0.20	1999
	AIRFRAME SHOP	19,046	1.5	0.66	1999
	ENGINE SHOP	4,000	1.25	0.11	1999
	AVIONICS SHOP	22,000	1.25	0.63	1999
	ARMAMENT SHOP	8,400	1.25	0.24	1999
	LIFE SUPPORT SHOP	5,000	1.25	0.14	1999
	BATTERY SHOP	1,500	1.25	0.04	1999
	GENERAL WAREHOUSE	25,000	1.25	0.72	1999
	BOQ	134	1200	3.69	1999
	BEQ	323	820	6.08	1999
	FAMILY HOUSING	100	4800	11.02	1999
	-----	-----	-----	-----	-----
	1999 SUBTOTAL	2,369,063	sq ft	75.83	1999
	GSE SHOP	24,000	1.5	0.83	2000
	GSE SHED	1,950	1.25	0.06	2000
	STORAGE SHED	10,000	1.25	0.29	2000
	OPEN STORAGE AREA	10,000	1.1	0.25	2000
	FUEL TANK STORAGE	600	1.5	0.02	2000
	ADMIN. OFFICES	18,000	2	0.83	2000
	DINING FACILITY	22,543	2	1.04	2000
	NEX FOOD SERVICE	5,400	2	0.25	2000
	COMMISSARY	4,000	2	0.18	2000
	ENLISTED CLUB	14,400	1.5	0.50	2000
	MINISTRY FACILITY	12,320	1.25	0.35	2000
	CHILD CENTER	32,778	1.25	0.94	2000
	YOUTH CENTER	8,550	1.25	0.25	2000
	BEQ	323	820	6.08	2000
	FAMILY HOUSING	100	4800	11.02	2000
	-----	-----	-----	-----	-----
	2000 SUBTOTAL	350,756	sq ft	22.87	2000

Notes: The disturbed site multiplier converts facility size into the an approximate construction site size (in square feet), including allowances for landscaping and parking.

BEQ and BOQ facilities are assumed to be multiple story buildings.

TABLE E-10. ESTIMATED CONSTRUCTION SITE ACREAGES FOR NAF EL CENTRO ALTERNATIVE

ALTERNATIVE	FACILITY	FACILITY SQ FT or PERSONNEL	DISTURBED SITE MULTIPLIER	GROSS SITE ACRES	YEAR
NAF EL CENTRO	CREDIT UNION	3,500	1.25	0.10	2001
	CRAFTS SHOP	4,000	1.25	0.11	2001
	AUTOMOTIVE SHOP	3,271	1.5	0.11	2001
	RENTAL CENTER	6,570	1.5	0.23	2001
	FAMILY HOUSING	100	4800	11.02	2001
	-----	-----	-----	-----	-----
	2001 SUBTOTAL	137,341	sq ft	11.57	2001
	BOWLING CENTER	2,591	1.5	0.09	2002
	FITNESS CENTER	5,001	1.5	0.17	2002
	PLAYING COURTS	1,200	1.5	0.04	2002
	FAMILY HOUSING	100	4800	11.02	2002
	-----	-----	-----	-----	-----
	2002 SUBTOTAL	128,792	sq ft	11.32	2002
	NAMTRA	17,400	1.25	0.50	2005
	WEAPONS SCHOOL	13,360	1.25	0.38	2005
	FLIGHT SIMULATOR	124,767	1.25	3.58	2005
	SQUADRON HANGAR	88,472	1.25	2.54	2005
	AIRFRAME SHOP	6,884	1.5	0.24	2005
	ENGINE SHOP	58,876	1.25	1.69	2005
	ENGINE TEST CELL	8,180	1.5	0.28	2005
	AVIONICS SHOP	40,233	1.25	1.15	2005
	LIFE SUPPORT SHOP	4,020	1.25	0.12	2005
	BATTERY SHOP	1,325	1.25	0.04	2005
	GENERAL WAREHOUSE	208,949	1.25	6.00	2005
	FAMILY HOUSING	75	4800	8.26	2005
	-----	-----	-----	-----	-----
	2005 SUBTOTAL	662,466	sq ft	24.78	2005

Notes: The disturbed site multiplier converts facility size into the an approximate construction site size (in square feet), including allowances for landscaping and parking.

BEQ and BOQ facilities are assumed to be multiple story buildings.

TABLE E-10. ESTIMATED CONSTRUCTION SITE ACREAGES FOR NAF EL CENTRO ALTERNATIVE

ALTERNATIVE	FACILITY	FACILITY SQ FT or PERSONNEL	DISTURBED SITE MULTIPLIER	GROSS SITE ACRES	YEAR
NAF EL CENTRO	FUEL TANK STORAGE	600	1.5	0.02	2006
	GENERAL WAREHOUSE	208,949	1.25	6.00	2006
	STORAGE SHED	7,500	1.25	0.22	2006
	OPEN STORAGE AREA	28,138	1.1	0.71	2006
	ADMIN. OFFICES	84,741	2	3.89	2006
	EXCHANGE	4,830	2	0.22	2006
	COMMISSARY	76,000	2	3.49	2006
	ENLISTED CLUB	42,602	1.5	1.47	2006
	YOUTH CENTER	8,737	1.25	0.25	2006
	MINISTRY FACILITY	22,572	1.25	0.65	2006
	BEQ	323	820	6.08	2006
	FAMILY HOUSING	75	4800	8.26	2006
	-----	-----	-----	-----	-----
	2006 SUBTOTAL	640,884	sq ft	31.25	2006
	GENERAL WAREHOUSE	208,949	1.25	6.00	2007
	OPEN STORAGE AREA	28,138	1.1	0.71	2007
	CREDIT UNION	4,700	1.25	0.13	2007
	CRAFTS SHOP	10,520	1.25	0.30	2007
	AUTOMOTIVE SHOP	6,666	1.5	0.23	2007
	BEQ	323	820	6.08	2007
	FAMILY HOUSING	75	4800	8.26	2007
	-----	-----	-----	-----	-----
	2007 SUBTOTAL	415,188	sq ft	21.72	2007
	OPEN STORAGE AREA	28,138	1.1	0.71	2008
	BOWLING CENTER	19,120	1.5	0.66	2008
	PLAYING COURTS	1,348	1.5	0.05	2008
	FAMILY HOUSING	75	4800	8.26	2008
	-----	-----	-----	-----	-----
	2008 SUBTOTAL	138,606	sq ft	9.68	2008
	FAMILY HOUSING	75	4800	8.26	2009
	-----	-----	-----	-----	-----
	2009 SUBTOTAL	90,000	sq ft	8.26	2009

Notes: The disturbed site multiplier converts facility size into the an approximate construction site size (in square feet), including allowances for landscaping and parking.

BEQ and BOQ facilities are assumed to be multiple story buildings.

TABLE E-11. CONSTRUCTION ASSUMPTIONS FOR 1999 PROJECTS, NAF EL CENTRO ALTERNATIVE

FUGITIVE DUST DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
PM10 portion of fugitive TSP	==>	20%	20%
area subject to surface disturbance	==>	76 acres	21 acres
typical area disturbed on any one day	==>	25 acres	21 acres
duration of activity phase on any area	==>	45 days	150 days
dust control program effectiveness	==>	50%	50%
Nominal Construction Period by Phase:		137 days	150 days
Nominal Overall Construction Period:		287 days	
CONSTRUCTION VEHICLE DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
		Number of Vehicles	Hours per Day
		-----	-----
track-type tractor	==>		
wheeled tractor	==>	2	6
cold planers and wheeled dozers	==>	4	6
scraper	==>	4	6
motor grader	==>	4	4
wheeled loader	==>	6	6
track-type loader	==>		2
off-highway truck	==>	6	6
static and vibratory rollers	==>		8
excavators/crawlers, trenchers	==>	4	4
concrete pavers, asphalt pavers	==>		3
cranes and miscellaneous equipment	==>		6
			4
Total Number of Construction Vehicles:		30	25
Construction Equipment Fuel Use Estimate, gallons/day:		1,592	796
Mean Fuel Consumption Rate, gallons/vehicle-hour:		9.7	7.1
Cumulative Hours of Heavy Equipment Use:		22,435	16,800
Total Cumulative Hours of Heavy Equipment Use:			39,235

Notes: The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.

Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.

Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

TABLE E-12. 1999 CONSTRUCTION SEASON EMISSIONS SUMMARY, NAF EL CENTRO ALTERNATIVE

Construction Phase	Construction Period Emissions (tons)				
	ROG	NOx	CO	SOx	PM10
Site Preparation Emissions	2.2	31.7	14.7	3.2	16.0
Facility Construction Emissions	1.3	19.3	9.7	1.9	14.0
Total Construction Period Emissions	3.5	51.0	24.4	5.1	30.0

Nominal Site and Foundation Preparation Period:	137 days
Nominal Facility Construction Period:	150 days
Nominal Acre-Days for Site and Foundation Preparation:	3,420 acre-days
Nominal Acre-Days for Facility Construction:	3,150 acre-days
Equipment Use for Site and Foundation Preparation:	22,435 vehicle-hours
Equipment Use for Facility Construction:	16,800 vehicle-hours
Normalized Equipment Use, Site & Foundation Preparation:	6.56 hours/acre-day
Normalized Equipment Use, Facility Construction:	5.33 hours/acre-day

Notes: ROG = reactive organic compounds  
 NOx = oxides of nitrogen  
 CO = carbon monoxide  
 PM10 = inhalable particulate matter  
 SOx = sulfur oxides

The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction. Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects. Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

Data Source: Emission rate data and procedures from U.S. Environmental Protection Agency 1985 (AP-42, Volume II, Section II-7) and U.S. Environmental Protection Agency 1995 (AP-42, Volume I, Section 13.2.3). Diesel vehicle exhaust TOG emission rates converted to ROG emission rates using 97.58% factor obtained from California Air Resources Board.

TABLE E-13. CONSTRUCTION ASSUMPTIONS FOR 2000 PROJECTS, NAF EL CENTRO ALTERNATIVE

FUGITIVE DUST DATA INPUT SECTION:		Site & Foundation Preparation		Facility Construction	
		-----		-----	
PM10 portion of fugitive TSP	==>	20%		20%	
area subject to surface disturbance	==>	23 acres		15 acres	
typical area disturbed on any one day	==>	15 acres		15 acres	
duration of activity phase on any area	==>	45 days		125 days	
dust control program effectiveness	==>	50%		50%	
Nominal Construction Period by Phase:		69 days		125 days	
Nominal Overall Construction Period:				194 days	
CONSTRUCTION VEHICLE DATA INPUT SECTION:		Site & Foundation Preparation		Facility Construction	
		-----		-----	
		Number of Vehicles	Hours per Day	Number of Vehicles	Hours per Day
		-----		-----	
track-type tractor	==>				
wheeled tractor	==>	1	6	1	4
cold planers and wheeled dozers	==>	2	6		
scraper	==>	3	6		
motor grader	==>	3	4		
wheeled loader	==>	4	6	2	4
track-type loader	==>				
off-highway truck	==>	5	6	6	4
static and vibratory rollers	==>			2	4
excavators/crawlers, trenchers	==>	3	4		
concrete pavers, asphalt pavers	==>			3	6
cranes and miscellaneous equipment	==>			4	4
Total Number of Construction Vehicles:		21		18	
Construction Equipment Fuel Use Estimate, gallons/day:		1,124		578	
Mean Fuel Consumption Rate, gallons/vehicle-hour:		9.9		7.4	
Cumulative Hours of Heavy Equipment Use:		7,866		9,750	
Total Cumulative Hours of Heavy Equipment Use:				17,616	

Notes: The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.

Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.

Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

TABLE E-14. 2000 CONSTRUCTION SEASON EMISSIONS SUMMARY, NAF EL CENTRO ALTERNATIVE

Construction Phase	Construction Period Emissions (tons)				
	ROG	NOx	CO	SOx	PM10
Site Preparation Emissions	0.8	11.2	4.9	1.2	5.0
Facility Construction Emissions	0.8	11.5	5.5	1.1	8.3
Total Construction Period Emissions	1.6	22.8	10.4	2.3	13.3

Nominal Site and Foundation Preparation Period:	69 days
Nominal Facility Construction Period:	125 days
Nominal Acre-Days for Site and Foundation Preparation:	1,035 acre-days
Nominal Acre-Days for Facility Construction:	1,875 acre-days
Equipment Use for Site and Foundation Preparation:	7,866 vehicle-hours
Equipment Use for Facility Construction:	9,750 vehicle-hours
Normalized Equipment Use, Site & Foundation Preparation:	7.60 hours/acre-day
Normalized Equipment Use, Facility Construction:	5.20 hours/acre-day

Notes: ROG = reactive organic compounds  
 NOx = oxides of nitrogen  
 CO = carbon monoxide  
 PM10 = inhalable particulate matter  
 SOx = sulfur oxides

The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction. Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects. Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

Data Source: Emission rate data and procedures from U.S. Environmental Protection Agency 1985 (AP-42, Volume II, Section II-7) and U.S. Environmental Protection Agency 1995 (AP-42, Volume I, Section 13.2.3). Diesel vehicle exhaust TOG emission rates converted to ROG emission rates using 97.58% factor obtained from California Air Resources Board.

TABLE E-15. CONSTRUCTION ASSUMPTIONS FOR 2001 PROJECTS, NAF EL CENTRO ALTERNATIVE

FUGITIVE DUST DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
PM10 portion of fugitive TSP	==>	20%	20%
area subject to surface disturbance	==>	12 acres	8 acres
typical area disturbed on any one day	==>	12 acres	8 acres
duration of activity phase on any area	==>	45 days	120 days
dust control program effectiveness	==>	50%	50%
Nominal Construction Period by Phase:		45 days	120 days
Nominal Overall Construction Period:		165 days	
CONSTRUCTION VEHICLE DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
		Number of Vehicles	Hours per Day
		-----	-----
track-type tractor	==>		
wheeled tractor	==>		1 4
cold planers and wheeled dozers	==>	2 6	
scraper	==>	2 6	
motor grader	==>	2 4	
wheeled loader	==>	4 6	2 4
track-type loader	==>		
off-highway truck	==>	5 6	4 4
static and vibratory rollers	==>		1 4
excavators/crawlers, trenchers	==>	3 4	
concrete pavers, asphalt pavers	==>		1 6
cranes and miscellaneous equipment	==>		2 4
Total Number of Construction Vehicles:		18	11
Construction Equipment Fuel Use Estimate, gallons/day:		1,006	363
Mean Fuel Consumption Rate, gallons/vehicle-hour:		10.3	7.9
Cumulative Hours of Heavy Equipment Use:		4,410	5,520
Total Cumulative Hours of Heavy Equipment Use:		9,930	

Notes: The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.

Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.

Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

TABLE E-16. 2001 CONSTRUCTION SEASON EMISSIONS SUMMARY, NAF EL CENTRO ALTERNATIVE

Construction Phase	Construction Period Emissions (tons)				
	ROG	NOx	CO	SOx	PM10
Site Preparation Emissions	0.4	6.6	2.6	0.7	2.6
Facility Construction Emissions	0.5	6.8	3.5	0.7	4.3
Total Construction Period Emissions	0.9	13.4	6.1	1.4	7.0

Nominal Site and Foundation Preparation Period:	45 days
Nominal Facility Construction Period:	120 days
Nominal Acre-Days for Site and Foundation Preparation:	540 acre-days
Nominal Acre-Days for Facility Construction:	960 acre-days
Equipment Use for Site and Foundation Preparation:	4,410 vehicle-hours
Equipment Use for Facility Construction:	5,520 vehicle-hours
Normalized Equipment Use, Site & Foundation Preparation:	8.17 hours/acre-day
Normalized Equipment Use, Facility Construction:	5.75 hours/acre-day

Notes: ROG = reactive organic compounds  
 NOx = oxides of nitrogen  
 CO = carbon monoxide  
 PM10 = inhalable particulate matter  
 SOx = sulfur oxides

The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction. Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects. Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

Data Source: Emission rate data and procedures from U.S. Environmental Protection Agency 1985 (AP-42, Volume II, Section II-7) and U.S. Environmental Protection Agency 1995 (AP-42, Volume I, Section 13.2.3). Diesel vehicle exhaust TOG emission rates converted to ROG emission rates using 97.58% factor obtained from California Air Resources Board.

TABLE E-17. CONSTRUCTION ASSUMPTIONS FOR 2002 PROJECTS, NAF EL CENTRO ALTERNATIVE

FUGITIVE DUST DATA INPUT SECTION:		Site & Foundation Preparation		Facility Construction	
		-----		-----	
PM10 portion of fugitive TSP	==>	20%		20%	
area subject to surface disturbance	==>	11 acres		8 acres	
typical area disturbed on any one day	==>	11 acres		8 acres	
duration of activity phase on any area	==>	45 days		120 days	
dust control program effectiveness	==>	50%		50%	
Nominal Construction Period by Phase:		45 days		120 days	
Nominal Overall Construction Period:				165 days	
CONSTRUCTION VEHICLE DATA INPUT SECTION:		Site & Foundation Preparation		Facility Construction	
		-----		-----	
		Number of Vehicles	Hours per Day	Number of Vehicles	Hours per Day
		-----		-----	
track-type tractor	==>				
wheeled tractor	==>			1	4
cold planers and wheeled dozers	==>	2	6		
scraper	==>	2	6		
motor grader	==>	2	4		
wheeled loader	==>	4	6	2	4
track-type loader	==>				
off-highway truck	==>	4	6	4	4
static and vibratory rollers	==>	3		1	4
excavators/crawlers, trenchers	==>	2	4		
concrete pavers, asphalt pavers	==>			1	6
cranes and miscellaneous equipment	==>			2	4
Total Number of Construction Vehicles:		19		11	
Construction Equipment Fuel Use Estimate, gallons/day:		901		363	
Mean Fuel Consumption Rate, gallons/vehicle-hour:		10.2		7.9	
Cumulative Hours of Heavy Equipment Use:		3,960		5,520	
Total Cumulative Hours of Heavy Equipment Use:				9,480	

Notes: The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.

Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.

Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

TABLE E-18. 2002 CONSTRUCTION SEASON EMISSIONS SUMMARY, NAF EL CENTRO ALTERNATIVE

Construction Phase	Construction Period Emissions (tons)				
	ROG	NOx	CO	SOx	PM10
Site Preparation Emissions	0.4	5.9	2.3	0.6	2.4
Facility Construction Emissions	0.5	6.8	3.5	0.7	4.3
Total Construction Period Emissions	0.9	12.7	5.8	1.3	6.7

Nominal Site and Foundation Preparation Period:	45 days
Nominal Facility Construction Period:	120 days
Nominal Acre-Days for Site and Foundation Preparation:	495 acre-days
Nominal Acre-Days for Facility Construction:	960 acre-days
Equipment Use for Site and Foundation Preparation:	3,960 vehicle-hours
Equipment Use for Facility Construction:	5,520 vehicle-hours
Normalized Equipment Use, Site & Foundation Preparation:	8.00 hours/acre-day
Normalized Equipment Use, Facility Construction:	5.75 hours/acre-day

Notes: ROG = reactive organic compounds  
 NOx = oxides of nitrogen  
 CO = carbon monoxide  
 PM10 = inhalable particulate matter  
 SOx = sulfur oxides

The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction. Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects. Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

Data Source: Emission rate data and procedures from U.S. Environmental Protection Agency 1985 (AP-42, Volume II, Section II-7) and U.S. Environmental Protection Agency 1995 (AP-42, Volume I, Section 13.2.3). Diesel vehicle exhaust TOG emission rates converted to ROG emission rates using 97.58% factor obtained from California Air Resources Board.

TABLE E-19. CONSTRUCTION ASSUMPTIONS FOR 2005 PROJECTS, NAF EL CENTRO ALTERNATIVE

FUGITIVE DUST DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
PM10 portion of fugitive TSP	==>	20%	20%
area subject to surface disturbance	==>	25 acres	10 acres
typical area disturbed on any one day	==>	15 acres	10 acres
duration of activity phase on any area	==>	45 days	150 days
dust control program effectiveness	==>	50%	50%
Nominal Construction Period by Phase:		75 days	150 days
Nominal Overall Construction Period:		225 days	
CONSTRUCTION VEHICLE DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
		Number of Vehicles	Hours per Day
		-----	-----
track-type tractor	==>		
wheeled tractor	==>	1	6
cold planers and wheeled dozers	==>	2	6
scraper	==>	2	6
motor grader	==>	3	4
wheeled loader	==>	4	6
track-type loader	==>		2
off-highway truck	==>	5	6
static and vibratory rollers	==>		5
excavators/crawlers, trenchers	==>	3	4
concrete pavers, asphalt pavers	==>		2
cranes and miscellaneous equipment	==>		3
			4
Total Number of Construction Vehicles:		20	18
Construction Equipment Fuel Use Estimate, gallons/day:		1,035	531
Mean Fuel Consumption Rate, gallons/vehicle-hour:		9.6	6.8
Cumulative Hours of Heavy Equipment Use:		8,100	11,700
Total Cumulative Hours of Heavy Equipment Use:		19,800	

Notes: The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.

Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.

Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

TABLE E-20. 2005 CONSTRUCTION SEASON EMISSIONS SUMMARY, NAF EL CENTRO ALTERNATIVE

Construction Phase	Construction Period Emissions (tons)				
	ROG	NOx	CO	SOx	PM10
Site Preparation Emissions	0.8	11.4	5.1	1.2	5.3
Facility Construction Emissions	1.0	13.0	7.1	1.2	7.0
Total Construction Period Emissions	1.7	24.3	12.2	2.4	12.3

Nominal Site and Foundation Preparation Period:	75 days
Nominal Facility Construction Period:	150 days
Nominal Acre-Days for Site and Foundation Preparation:	1,125 acre-days
Nominal Acre-Days for Facility Construction:	1,500 acre-days
Equipment Use for Site and Foundation Preparation:	8,100 vehicle-hours
Equipment Use for Facility Construction:	11,700 vehicle-hours
Normalized Equipment Use, Site & Foundation Preparation:	7.20 hours/acre-day
Normalized Equipment Use, Facility Construction:	7.80 hours/acre-day

Notes: ROG = reactive organic compounds  
 NOx = oxides of nitrogen  
 CO = carbon monoxide  
 PM10 = inhalable particulate matter  
 SOx = sulfur oxides

The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction. Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects. Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

Data Source: Emission rate data and procedures from U.S. Environmental Protection Agency 1985 (AP-42, Volume II, Section II-7) and U.S. Environmental Protection Agency 1995 (AP-42, Volume I, Section 13.2.3). Diesel vehicle exhaust TOG emission rates converted to ROG emission rates using 97.58% factor obtained from California Air Resources Board.

TABLE E-21. CONSTRUCTION ASSUMPTIONS FOR 2006 PROJECTS, NAF EL CENTRO ALTERNATIVE

FUGITIVE DUST DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
PM10 portion of fugitive TSP	==>	20%	20%
area subject to surface disturbance	==>	31 acres	17 acres
typical area disturbed on any one day	==>	15 acres	17 acres
duration of activity phase on any area	==>	45 days	150 days
dust control program effectiveness	==>	50%	50%
Nominal Construction Period by Phase:		93 days	150 days
Nominal Overall Construction Period:		243 days	
CONSTRUCTION VEHICLE DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
		Number of Vehicles	Hours per Day
		-----	-----
track-type tractor	==>		
wheeled tractor	==>	1	6
cold planers and wheeled dozers	==>	2	6
scraper	==>	3	6
motor grader	==>	3	4
wheeled loader	==>	4	6
track-type loader	==>		3
off-highway truck	==>	5	6
static and vibratory rollers	==>		7
excavators/crawlers, trenchers	==>	4	4
concrete pavers, asphalt pavers	==>		2
cranes and miscellaneous equipment	==>		4
			6
			4
Total Number of Construction Vehicles:		22	22
Construction Equipment Fuel Use Estimate, gallons/day:		1,142	698
Mean Fuel Consumption Rate, gallons/vehicle-hour:		9.7	7.3
Cumulative Hours of Heavy Equipment Use:		10,974	14,400
Total Cumulative Hours of Heavy Equipment Use:		25,374	

Notes: The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.

Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.

Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

TABLE E-22. 2006 CONSTRUCTION SEASON EMISSIONS SUMMARY, NAF EL CENTRO ALTERNATIVE

Construction Phase	Construction Period Emissions (tons)				
	ROG	NOx	CO	SOx	PM10
Site Preparation Emissions	1.1	15.5	6.8	1.6	6.7
Facility Construction Emissions	1.2	16.8	8.7	1.6	11.4
Total Construction Period Emissions	2.3	32.3	15.4	3.2	18.2

Nominal Site and Foundation Preparation Period:	93 days
Nominal Facility Construction Period:	150 days
Nominal Acre-Days for Site and Foundation Preparation:	1,395 acre-days
Nominal Acre-Days for Facility Construction:	2,550 acre-days
Equipment Use for Site and Foundation Preparation:	10,974 vehicle-hours
Equipment Use for Facility Construction:	14,400 vehicle-hours
Normalized Equipment Use, Site & Foundation Preparation:	7.87 hours/acre-day
Normalized Equipment Use, Facility Construction:	5.65 hours/acre-day

Notes: ROG = reactive organic compounds  
 NOx = oxides of nitrogen  
 CO = carbon monoxide  
 PM10 = inhalable particulate matter  
 SOx = sulfur oxides

The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction. Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects. Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

Data Source: Emission rate data and procedures from U.S. Environmental Protection Agency 1985 (AP-42, Volume II, Section II-7) and U.S. Environmental Protection Agency 1995 (AP-42, Volume I, Section 13.2.3). Diesel vehicle exhaust TOG emission rates converted to ROG emission rates using 97.58% factor obtained from California Air Resources Board.

TABLE E-23. CONSTRUCTION ASSUMPTIONS FOR 2007 PROJECTS, NAF EL CENTRO ALTERNATIVE

FUGITIVE DUST DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
PM10 portion of fugitive TSP	==>	20%	20%
area subject to surface disturbance	==>	22 acres	12 acres
typical area disturbed on any one day	==>	12 acres	12 acres
duration of activity phase on any area	==>	45 days	150 days
dust control program effectiveness	==>	50%	50%
Nominal Construction Period by Phase:		83 days	150 days
Nominal Overall Construction Period:		233 days	
CONSTRUCTION VEHICLE DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
		Number of Vehicles	Hours per Day
		-----	-----
track-type tractor	==>		
wheeled tractor	==>	1	6
cold planers and wheeled dozers	==>	2	6
scraper	==>	2	6
motor grader	==>	2	4
wheeled loader	==>	3	6
track-type loader	==>		2
off-highway truck	==>	5	6
static and vibratory rollers	==>		5
excavators/crawlers, trenchers	==>	3	4
concrete pavers, asphalt pavers	==>		2
cranes and miscellaneous equipment	==>		3
			4
Total Number of Construction Vehicles:		18	18
Construction Equipment Fuel Use Estimate, gallons/day:		989	531
Mean Fuel Consumption Rate, gallons/vehicle-hour:		10.1	6.8
Cumulative Hours of Heavy Equipment Use:		8,085	11,700
Total Cumulative Hours of Heavy Equipment Use:		19,785	

Notes: The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.

Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.

Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

TABLE E-24. 2007 CONSTRUCTION SEASON EMISSIONS SUMMARY, NAF EL CENTRO ALTERNATIVE

Construction Phase	Construction Period Emissions (tons)				
	ROG	NOx	CO	SOx	PM10
Site Preparation Emissions	0.8	11.9	5.4	1.2	4.8
Facility Construction Emissions	1.0	13.0	7.1	1.2	8.2
Total Construction Period Emissions	1.7	24.9	12.5	2.5	13.0

Nominal Site and Foundation Preparation Period:	83 days
Nominal Facility Construction Period:	150 days
Nominal Acre-Days for Site and Foundation Preparation:	990 acre-days
Nominal Acre-Days for Facility Construction:	1,800 acre-days
Equipment Use for Site and Foundation Preparation:	8,085 vehicle-hours
Equipment Use for Facility Construction:	11,700 vehicle-hours
Normalized Equipment Use, Site & Foundation Preparation:	8.17 hours/acre-day
Normalized Equipment Use, Facility Construction:	6.50 hours/acre-day

Notes: ROG = reactive organic compounds  
 NOx = oxides of nitrogen  
 CO = carbon monoxide  
 PM10 = inhalable particulate matter  
 SOx = sulfur oxides

The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction. Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects. Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

Data Source: Emission rate data and procedures from U.S. Environmental Protection Agency 1985 (AP-42, Volume II, Section II-7) and U.S. Environmental Protection Agency 1995 (AP-42, Volume I, Section 13.2.3). Diesel vehicle exhaust TOG emission rates converted to ROG emission rates using 97.58% factor obtained from California Air Resources Board.

TABLE E-25. CONSTRUCTION ASSUMPTIONS FOR 2008 PROJECTS, NAF EL CENTRO ALTERNATIVE

FUGITIVE DUST DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
PM10 portion of fugitive TSP	==>	20%	20%
area subject to surface disturbance	==>	10 acres	6 acres
typical area disturbed on any one day	==>	10 acres	6 acres
duration of activity phase on any area	==>	45 days	150 days
dust control program effectiveness	==>	50%	50%
Nominal Construction Period by Phase:		45 days	150 days
Nominal Overall Construction Period:		195 days	
CONSTRUCTION VEHICLE DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
		Number of Vehicles	Hours per Day
		-----	-----
track-type tractor	==>		
wheeled tractor	==>		1 4
cold planers and wheeled dozers	==>	2 6	
scraper	==>	2 6	
motor grader	==>	2 4	
wheeled loader	==>	2 6	1 4
track-type loader	==>		
off-highway truck	==>	4 6	3 4
static and vibratory rollers	==>		1 4
excavators/crawlers, trenchers	==>	2 4	
concrete pavers, asphalt pavers	==>		2 6
cranes and miscellaneous equipment	==>		2 4
Total Number of Construction Vehicles:		14	10
Construction Equipment Fuel Use Estimate, gallons/day:		831	308
Mean Fuel Consumption Rate, gallons/vehicle-hour:		10.9	7.0
Cumulative Hours of Heavy Equipment Use:		3,420	6,600
Total Cumulative Hours of Heavy Equipment Use:		10,020	

Notes: The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction.

Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects.

Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

TABLE E-26. 2008 CONSTRUCTION SEASON EMISSIONS SUMMARY, NAF EL CENTRO ALTERNATIVE

Construction Phase	Construction Period Emissions (tons)				
	ROG	NOx	CO	SOx	PM10
Site Preparation Emissions	0.3	5.4	2.1	0.6	2.2
Facility Construction Emissions	0.5	7.5	4.0	0.7	4.1
Total Construction Period Emissions	0.9	12.8	6.1	1.3	6.3

Nominal Site and Foundation Preparation Period:	45 days
Nominal Facility Construction Period:	150 days
Nominal Acre-Days for Site and Foundation Preparation:	450 acre-days
Nominal Acre-Days for Facility Construction:	900 acre-days
Equipment Use for Site and Foundation Preparation:	3,420 vehicle-hours
Equipment Use for Facility Construction:	6,600 vehicle-hours
Normalized Equipment Use, Site & Foundation Preparation:	7.60 hours/acre-day
Normalized Equipment Use, Facility Construction:	7.33 hours/acre-day

Notes: ROG = reactive organic compounds  
 NOx = oxides of nitrogen  
 CO = carbon monoxide  
 PM10 = inhalable particulate matter  
 SOx = sulfur oxides

The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction. Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects. Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

Data Source: Emission rate data and procedures from U.S. Environmental Protection Agency 1985 (AP-42, Volume II, Section II-7) and U.S. Environmental Protection Agency 1995 (AP-42, Volume I, Section 13.2.3). Diesel vehicle exhaust TOG emission rates converted to ROG emission rates using 97.58% factor obtained from California Air Resources Board.

TABLE E-27. CONSTRUCTION ASSUMPTIONS FOR 2009 PROJECTS, NAF EL CENTRO ALTERNATIVE

FUGITIVE DUST DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
PM10 portion of fugitive TSP	==>	20%	20%
area subject to surface disturbance	==>	8 acres	6 acres
typical area disturbed on any one day	==>	8 acres	6 acres
duration of activity phase on any area	==>	45 days	150 days
dust control program effectiveness	==>	50%	50%
Nominal Construction Period by Phase:		45 days	150 days
Nominal Overall Construction Period:		195 days	
CONSTRUCTION VEHICLE DATA INPUT SECTION:		Site & Foundation Preparation	Facility Construction
		-----	-----
		Number of Vehicles	Hours per Day
		-----	-----
track-type tractor	==>		
wheeled tractor	==>		1 4
cold planers and wheeled dozers	==>	2 6	
scraper	==>	2 6	
motor grader	==>	2 4	
wheeled loader	==>	2 6	1 4
track-type loader	==>		
off-highway truck	==>	4 6	3 4
static and vibratory rollers	==>		1 4
excavators/crawlers, trenchers	==>	2 4	
concrete pavers, asphalt pavers	==>		2 6
cranes and miscellaneous equipment	==>		2 4
Total Number of Construction Vehicles:		14	10
Construction Equipment Fuel Use Estimate, gallons/day:		831	308
Mean Fuel Consumption Rate, gallons/vehicle-hour:		10.9	7.0
Cumulative Hours of Heavy Equipment Use:		3,420	6,600
Total Cumulative Hours of Heavy Equipment Use:		10,020	

Notes: The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (mostly sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction. Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects. Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

TABLE E-28. 2009 CONSTRUCTION SEASON EMISSIONS SUMMARY, NAF EL CENTRO ALTERNATIVE

Construction Phase	Construction Period Emissions (tons)				
	ROG	NOx	CO	SOx	PM10
Site Preparation Emissions	0.3	5.4	2.1	0.6	1.8
Facility Construction Emissions	0.5	7.5	4.0	0.7	4.1
Total Construction Period Emissions	0.9	12.8	6.1	1.3	6.0

Nominal Site and Foundation Preparation Period:	45 days
Nominal Facility Construction Period:	150 days
Nominal Acre-Days for Site and Foundation Preparation:	360 acre-days
Nominal Acre-Days for Facility Construction:	900 acre-days
Equipment Use for Site and Foundation Preparation:	3,420 vehicle-hours
Equipment Use for Facility Construction:	6,600 vehicle-hours
Normalized Equipment Use, Site & Foundation Preparation:	9.50 hours/acre-day
Normalized Equipment Use, Facility Construction:	7.33 hours/acre-day

Notes: ROG = reactive organic compounds  
 NOx = oxides of nitrogen  
 CO = carbon monoxide  
 PM10 = inhalable particulate matter  
 SOx = sulfur oxides

The PM10 fraction of fugitive dust is based on typical silt plus clay content of project area soil types (sandy loam or sandy clay loam). Areas subject to surface disturbance include the entire construction site during site and foundation preparation; facility footprints and areas paved early in the construction process are excluded from the disturbed area during actual facility construction. Construction vehicle numbers are estimated from construction site sizes and the nature of individual construction projects. Dust control program effectiveness assumes implementation of normal fugitive dust control practices.

Data Source: Emission rate data and procedures from U.S. Environmental Protection Agency 1985 (AP-42, Volume II, Section II-7) and U.S. Environmental Protection Agency 1995 (AP-42, Volume I, Section 13.2.3). Diesel vehicle exhaust TOG emission rates converted to ROG emission rates using 97.58% factor obtained from California Air Resources Board.

TABLE E-29. CONSTRUCTION ACTIVITY EMISSION FACTORS

EQUIPMENT TYPE	EMISSION RATE, GRAMS/HOUR					FUEL USE (gal/hr)
	ROG	NOx	CO	PM10	SOx	
track-type tractor	53.73	570.70	157.01	50.70	62.30	4.4
wheeled tractor	83.20	575.84	1,622.77	61.50	40.90	2.9
cold planers and wheeled dozers	84.74	1,889.16	816.81	75.00	158.00	14.6
scraper	125.05	1,740.74	568.19	184.00	210.00	14.8
motor grader	17.63	324.43	68.46	27.70	39.00	2.8
wheeled loader	110.43	858.19	259.58	77.90	82.50	5.8
track-type loader	43.47	375.22	91.15	26.40	34.40	2.4
off-highway truck	84.74	1,889.16	816.81	116.00	206.00	14.6
static and vibratory rollers	29.84	392.90	137.97	22.70	30.50	2.1
excavators/crawlers, trenchers	67.67	767.30	306.37	63.20	64.70	4.5
concrete pavers, asphalt pavers	67.67	767.30	306.37	63.20	64.70	4.5
cranes and miscellaneous equipment	67.67	767.30	306.37	63.20	64.70	4.5

FUGITIVE DUST TSP EMISSION RATE: 1.2 TONS/ACRE/MONTH, 30 WORK DAYS/MONTH

SOIL TEXTURE CLASS	PERCENT CLAY + SILT	ESTIMATED % PM10
Clay	45 - 100 %	30 - 85 %
Silt	80 - 100 %	40 - 80 %
Silty Clay	80 - 100 %	40 - 70 %
Silty Loam	50 - 100 %	30 - 70 %
Silty Clay Loam	80 - 100 %	30 - 60 %
Clay Loam	45 - 80 %	30 - 50 %
Loam	45 - 75 %	25 - 45 %
Sandy Clay	35 - 55 %	25 - 45 %
Sandy Clay Loam	20 - 55 %	15 - 40 %
Sandy Loam	15 - 55 %	10 - 30 %
Sand	0 - 15 %	0 - 15 %

## Notes:

ROG = reactive organic compounds

NOx = oxides of nitrogen

CO = carbon monoxide

PM10 = inhalable particulate matter (below 50 microns aerodynamic equivalent diameter)

SOx = sulfur oxides

TSP = total suspended particulate matter

Clay = soil particles with a sieve diameter below 2 microns (may form large particle aggregates)

Silt = soil particles with a sieve diameter between 2 and 50 microns

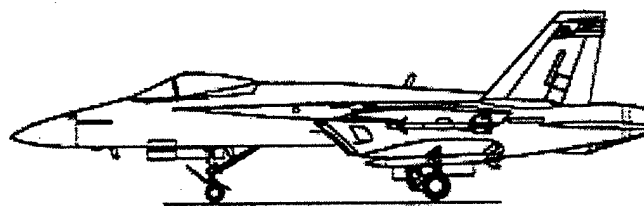
Diesel exhaust ROG = 97.58% of TOG (California Air Resources Board EMFAC7F model)

## Data Sources:

U.S. Environmental Protection Agency, 1985b: (AP-42, Volume II, Section II-7)

U.S. Environmental Protection Agency, 1995: (AP-42, Volume I, Section 13.2.3).

Wild, Alan. 1993. Soils and the Environment: An Introduction. Cambridge University Press.



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## F/A-18 AIRCRAFT EMISSIONS ANALYSIS

Aircraft Type	Number of Engines	Engine Models Used For Emissions Analysis	Annual Flight Operations	Flight Activity	Fraction of Annual Flight Operations	Engine Power or Thrust Setting	Average Daily Flight Operations				Time In Mode (minutes)	Fuel Flow Rate per Engine (lb/hr)	Modal Emission Rate (pounds per 1,000 pounds fuel flow)				
							Total Annual Flight Operations	Fall	Spring	Winter			Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Dioxide	Particulate Matter
F/A-18E/F (FRS) [36 ACFT]	2	F414-GE-400 F404-GE-400 GTC 36-200	67,128	Departure	11.01%	APU Use	On	7,393	21.6	16.2	2.5	197	0.25	6.25	2.00	0.40	0.22
								7,393	21.6	16.2	12.0	749	54.20	3.29	88.85	0.40	12.79
								7,393	21.6	16.2	5.9	749	54.20	3.29	88.85	0.40	17.79
								7,393	21.6	16.2	0.4	35,603	4.72	9.47	262.12	0.40	0.29
								0	0.0	0.0	0.5	10,986	0.12	34.94	0.69	0.40	1.66
								7,393	21.6	16.2	0.7	10,986	0.12	34.94	0.69	0.40	1.66
								1,515	4.4	3.3	1.6	3,357	0.13	9.71	1.40	0.40	6.55
								5,878	17.2	12.9	2.9	3,357	0.13	9.71	1.40	0.40	6.55
								7,393	21.6	16.2	5.9	749	54.20	3.29	88.85	0.40	12.79
								5,914	17.3	13.0	11.0	749	54.20	3.29	88.85	0.40	12.79
				Touch-and-Go	20.52%	Approach	85% rpm	13,778	40.2	30.3	1.5	3,357	0.13	9.71	1.40	0.40	6.55
								13,778	40.2	30.3	0.3	10,986	0.12	34.94	0.69	0.40	1.66
								13,778	40.2	30.3	1.5	3,357	0.13	9.71	1.40	0.40	6.55
								10,539	30.8	23.2	2.9	3,357	0.13	9.71	1.40	0.40	6.55
				FCLP	15.70%	Approach	85% rpm	10,539	30.8	23.2	0.3	10,986	0.12	34.94	0.69	0.40	1.66
								10,539	30.8	23.2	0.3	10,986	0.12	34.94	0.69	0.40	1.66
								10,539	30.8	23.2	3.0	3,357	0.13	9.71	1.40	0.40	6.55
				GCA Box	2.03%	Approach	85% rpm	1,362	4.0	3.0	4.0	3,357	0.13	9.71	1.40	0.40	6.55
								1,362	4.0	3.0	0.7	10,986	0.12	34.94	0.69	0.40	1.66
								1,362	4.0	3.0	4.0	3,357	0.13	9.71	1.40	0.40	6.55
				ACLS	0.73%	Approach	85% rpm	492	1.4	1.1	2.9	3,357	0.13	9.71	1.40	0.40	6.55
								492	1.4	1.1	0.3	10,986	0.12	34.94	0.69	0.40	1.66
								492	1.4	1.1	3.0	3,357	0.13	9.71	1.40	0.40	6.55
FRS squadron subtotal below 3,000 feet									67,128	196.0	147.6						
									100.00%								

TABLE E-30. DATA USED TO ESTIMATE EMISSIONS FROM ADDED F/A-18E/F AIR OPERATIONS

Aircraft Type	Number of Engines	Engine Models Used For Emissions Analysis	Annual Flight Operations	Flight Activity	Fraction of Annual Flight Operations	Engine Power or Thrust Setting	Average Daily Flight Operations				Fuel Flow Rate per Engine (lb/hr)	Modal Emission Rate (pounds per 1,000 pounds fuel flow)					
							Flight Mode	Spring	Fall	Winter		Time In Mode (minutes)	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Dioxide	
F/A-18E/F (FLEET, PHASE 1) [56 ACFT]	2	F414-GE-400 F404-GE-400 GTC 36-200	20,282	Departure	17.83%	APU Use	On	3,617	10.6	7.9	2.5	197	0.25	6.25	2.00	0.40	0.22
					17.83%	Checks	G Idle	3,617	10.6	7.9	12.0	749	54.20	3.29	88.85	0.40	12.79
					17.83%	Taxi Out	G Idle	3,617	10.6	7.9	5.9	749	54.20	3.29	88.85	0.40	17.79
					17.83%	AB Takeoff	Max AB	3,617	10.6	7.9	0.4	35,603	4.72	9.47	262.12	0.40	0.29
					0.00%	NoAB Takeoff	IRP	0	0.0	0.0	0.5	10,986	0.12	34.94	0.69	0.40	1.66
					17.83%	Climbout	IRP	3,617	10.6	7.9	0.7	10,986	0.12	34.94	0.69	0.40	1.66
				Arrival	2.88%	Straight In	85% rpm	585	1.7	1.3	1.6	3,357	0.13	9.71	1.40	0.40	6.55
					14.95%	Overhead In	85% rpm	3,032	8.9	6.7	2.9	3,357	0.13	9.71	1.40	0.40	6.55
					17.83%	Taxi In	G Idle	3,617	10.6	7.9	5.9	749	54.20	3.29	88.85	0.40	12.79
					14.27%	Hot Refuel	G Idle	2,894	8.4	6.4	11.0	749	54.20	3.29	88.85	0.40	12.79
			Touch-and-Go	5.38%	Approach	85% rpm	1,091	3.2	2.4	1.5	3,357	0.13	9.71	1.40	0.40	6.55	
				5.38%	Climbout	IRP	1,091	3.2	2.4	0.3	10,986	0.12	34.94	0.69	0.40	1.66	
				5.38%	Circle	85% rpm	1,091	3.2	2.4	1.5	3,357	0.13	9.71	1.40	0.40	6.55	
			FCLP	25.50%	Approach	85% rpm	5,172	15.1	11.4	2.9	3,357	0.13	9.71	1.40	0.40	6.55	
				25.50%	Climbout	IRP	5,172	15.1	11.4	0.3	10,986	0.12	34.94	0.69	0.40	1.66	
				25.50%	Circle	85% rpm	5,172	15.1	11.4	3.0	3,357	0.13	9.71	1.40	0.40	6.55	
			GCA Box	0.79%	Approach	85% rpm	161	0.5	0.4	4.0	3,357	0.13	9.71	1.40	0.40	6.55	
				0.79%	Climbout	IRP	161	0.5	0.4	0.7	10,986	0.12	34.94	0.69	0.40	1.66	
				0.79%	Circle	85% rpm	161	0.5	0.4	4.0	3,357	0.13	9.71	1.40	0.40	6.55	
			ACLS	0.49%	Approach	85% rpm	100	0.3	0.2	2.9	3,357	0.13	9.71	1.40	0.40	6.55	
				0.49%	Climbout	IRP	100	0.3	0.2	0.3	10,986	0.12	34.94	0.69	0.40	1.66	
				0.49%	Circle	85% rpm	100	0.3	0.2	3.0	3,357	0.13	9.71	1.40	0.40	6.55	
Phase 1 fleet squadrons subtotal below 3,000 feet					100.0%			20,282	59.4	44.7							

TABLE E-30. DATA USED TO ESTIMATE EMISSIONS FROM ADDED F/A-18E/F AIR OPERATIONS

Aircraft Type	Number of Engines	Engine Models Used For Emissions Analysis	Flight Activity	Fraction of Annual Flight Operations	Engine Power or Thrust Setting	Average Daily Flight Operations			Fuel Flow Rate per Engine (lb/hr)	Modal Emission Rate (pounds per 1,000 pounds fuel flow)							
						Total Annual Flight Operations	Time In Mode (minutes)			Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter			
							Fall	Spring							Winter		
F/A-18E/F (FLEET, PHASE 2) [72 ACFT]	2	F414-GE-400 F404-GE-400 GTC 36-200	Departure	17.83%	APU Use	On	4,650	13.6	10.2	2.5	197	0.25	6.25	2.00	0.40	0.22	
				17.83%	Checks	G Idle	4,650	13.6	10.2	12.0	749	54.20	3.29	88.85	0.40	12.79	
				17.83%	Taxi Out	G Idle	4,650	13.6	10.2	5.9	749	54.20	3.29	88.85	0.40	17.79	
				17.83%	AB Takeoff	Max AB	4,650	13.6	10.2	0.4	35,603	4.72	9.47	262.12	0.40	0.29	
				0.00%	NoAB Takeoff	IRP	0	0.0	0.0	0.5	10,986	0.12	34.94	0.69	0.40	1.66	
				17.83%	Climbout	IRP	4,650	13.6	10.2	0.7	10,986	0.12	34.94	0.69	0.40	1.66	
				Arrival	2.88%	Straight In	85% rpm	752	2.2	1.7	1.6	3,357	0.13	9.71	1.40	0.40	6.55
					14.95%	Overhead In	85% rpm	3,898	11.4	8.6	2.9	3,357	0.13	9.71	1.40	0.40	6.55
					17.83%	Taxi In	G Idle	4,650	13.6	10.2	5.9	749	54.20	3.29	88.85	0.40	12.79
					14.27%	Hot Refuel	G Idle	3,720	10.9	8.2	11.0	749	54.20	3.29	88.85	0.40	12.79
Touch-and-Go	5.38%	Approach	85% rpm	1,403	4.1	3.1	1.5	3,357	0.13	9.71	1.40	0.40	6.55				
	5.38%	Climbout	IRP	1,403	4.1	3.1	0.3	10,986	0.12	34.94	0.69	0.40	1.66				
	5.38%	Circle	85% rpm	1,403	4.1	3.1	1.5	3,357	0.13	9.71	1.40	0.40	6.55				
FCLP	25.50%	Approach	85% rpm	6,650	19.4	14.6	2.9	3,357	0.13	9.71	1.40	0.40	6.55				
	25.50%	Climbout	IRP	6,650	19.4	14.6	0.3	10,986	0.12	34.94	0.69	0.40	1.66				
	25.50%	Circle	85% rpm	6,650	19.4	14.6	3.0	3,357	0.13	9.71	1.40	0.40	6.55				
GCA Box	0.79%	Approach	85% rpm	207	0.6	0.5	4.0	3,357	0.13	9.71	1.40	0.40	6.55				
	0.79%	Climbout	IRP	207	0.6	0.5	0.7	10,986	0.12	34.94	0.69	0.40	1.66				
	0.79%	Circle	85% rpm	207	0.6	0.5	4.0	3,357	0.13	9.71	1.40	0.40	6.55				
ACLS	0.49%	Approach	85% rpm	129	0.4	0.3	2.9	3,357	0.13	9.71	1.40	0.40	6.55				
	0.49%	Climbout	IRP	129	0.4	0.3	0.3	10,986	0.12	34.94	0.69	0.40	1.66				
	0.49%	Circle	85% rpm	129	0.4	0.3	3.0	3,357	0.13	9.71	1.40	0.40	6.55				
Phase 2 fleet squadrons subtotal below 3,000 feet							26,076	76.2	57.5								

TABLE E-30. DATA USED TO ESTIMATE EMISSIONS FROM ADDED F/A-18E/F AIR OPERATIONS

Aircraft Type	Number of Engines	Engine Models Used For Emissions Analysis	Annual Flight Operations	Flight Activity	Fraction of Annual Flight Operations	Engine		Total Annual Flight Operations	Average Daily Flight Operations			Time In Mode (minutes)	Fuel Flow Rate per Engine (lb/hr)	Modal Emission Rate (pounds per 1,000 pounds fuel flow)				
						Power or Thrust Setting	Flight Mode		Operations	Spring	Fall			Winter	Reactive Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter
F/A-18C/D (REPLACED FLEET, PHASE 2) [72 ACFT]	2	F404-GE-400 GTC 36-200	26,076	Departure	17.83%	APU Use	On	4,650	13.6	10.2	2.5	197	0.25	6.25	2.00	0.40	0.22	
					17.83%	Checks	G Idle	4,650	13.6	10.2	12.0	624	58.18	1.16	137.34	0.40	12.38	
					17.83%	Taxi Out	G Idle	4,650	13.6	10.2	5.9	624	58.18	1.16	137.34	0.40	12.38	
					17.83%	AB Takeoff	Max AB	4,650	13.6	10.2	0.4	28,397	0.13	9.22	23.12	0.40	2.81	
					0.00%	NoAB Takeoff	IRP	0	0.0	0.0	0.5	8,587	0.31	25.16	1.05	0.40	2.81	
					17.83%	Climbout	IRP	4,650	13.6	10.2	0.7	8,587	0.31	25.16	1.05	0.40	2.81	
					2.88%	Straight In	85% rpm	752	2.2	1.7	1.6	4,005	0.44	8.37	1.78	0.40	6.10	
					14.95%	Overhead In	85% rpm	3,898	11.4	8.6	2.9	4,005	0.44	8.37	1.78	0.40	6.10	
					17.83%	Taxi In	G Idle	4,650	13.6	10.2	5.9	624	58.18	1.16	137.34	0.40	12.38	
					14.27%	Hot Refuel	G Idle	3,720	10.9	8.2	11.0	624	58.18	1.16	137.34	0.40	12.38	
Touch-and-Go				Arrival	5.38%	Approach	85% rpm	1,403	4.1	3.1	1.5	4,005	0.44	8.37	1.78	0.40	6.10	
					5.38%	Climbout	IRP	1,403	4.1	3.1	0.3	8,587	0.31	25.16	1.05	0.40	2.81	
					5.38%	Circle	85% rpm	1,403	4.1	3.1	1.5	4,005	0.44	8.37	1.78	0.40	6.10	
					25.50%	Approach	85% rpm	6,650	19.4	14.6	2.9	4,005	0.44	8.37	1.78	0.40	6.10	
FCLP					25.50%	Climbout	IRP	6,650	19.4	14.6	0.3	8,587	0.31	25.16	1.05	0.40	2.81	
					25.50%	Circle	85% rpm	6,650	19.4	14.6	3.0	4,005	0.44	8.37	1.78	0.40	6.10	
					0.79%	Approach	85% rpm	207	0.6	0.5	4.0	4,005	0.44	8.37	1.78	0.40	6.10	
GCA Box					0.79%	Approach	85% rpm	207	0.6	0.5	0.7	8,587	0.31	25.16	1.05	0.40	2.81	
					0.79%	Climbout	IRP	207	0.6	0.5	0.7	8,587	0.31	25.16	1.05	0.40	2.81	
					0.79%	Circle	85% rpm	207	0.6	0.5	4.0	4,005	0.44	8.37	1.78	0.40	6.10	
ACLS					0.49%	Approach	85% rpm	129	0.4	0.3	2.9	4,005	0.44	8.37	1.78	0.40	6.10	
					0.49%	Climbout	IRP	129	0.4	0.3	0.3	8,587	0.31	25.16	1.05	0.40	2.81	
					0.49%	Circle	85% rpm	129	0.4	0.3	3.0	4,005	0.44	8.37	1.78	0.40	6.10	
Replaced C/D fleet squadrons subtotal below 3,000 feet																		
26,076 76.2 57.5																		
100.0%																		

TABLE E-30. DATA USED TO ESTIMATE EMISSIONS FROM ADDED F/A-18E/F AIR OPERATIONS

Aircraft Type	Number of Engines	Engine Models Used For Emissions Analysis	Annual Flight Operations	Flight Activity	Fraction of Annual Flight Operations	Engine Power or Thrust Setting	Average Daily Flight Operations			Time In Mode (minutes)	Fuel Flow Rate per Engine (lb/hr)	Modal Emission Rate (pounds per 1,000 pounds fuel flow)					
							Total Annual Flight Operations	Flight Operations				Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	
								Fall	Spring								Winter
F/A-18E/F (PHASE 1 TOTALS)	2	F414-GE-400 F404-GE-400 GTC 36-200	87,410	Departure	12.60%	APU Use	On	11,010	32.1	24.2	2.5	197	0.25	6.25	2.00	0.40	0.22
					12.60%	Checks	G Idle	11,010	32.1	24.2	12.0	749	54.20	3.29	88.85	0.40	12.79
					12.60%	Taxi Out	G Idle	11,010	32.1	24.2	5.9	749	54.20	3.29	88.85	0.40	17.79
					12.60%	AB Takeoff	Max AB	11,010	32.1	24.2	0.4	35,603	4.72	9.47	262.12	0.40	0.29
					0.00%	NoAB Takeoff	IRP	0	0.0	0.0	0.5	10,986	0.12	34.94	0.69	0.40	1.66
					12.60%	Climbout	IRP	11,010	32.1	24.2	0.7	10,986	0.12	34.94	0.69	0.40	1.66
				Arrival	2.40%	Straight In	85% rpm	2,100	6.1	4.6	1.6	3,357	0.13	9.71	1.40	0.40	6.55
					10.19%	Overhead In	85% rpm	8,910	26.0	19.6	2.9	3,357	0.13	9.71	1.40	0.40	6.55
					12.60%	Taxi In	G Idle	11,010	32.1	24.2	5.9	749	54.20	3.29	88.85	0.40	12.79
					10.08%	Hot Refuel	G Idle	8,808	25.7	19.4	11.0	749	54.20	3.29	88.85	0.40	12.79
				Touch-and-Go	17.01%	Approach	85% rpm	14,869	43.4	32.7	1.5	3,357	0.13	9.71	1.40	0.40	6.55
					17.01%	Climbout	IRP	14,869	43.4	32.7	0.3	10,986	0.12	34.94	0.69	0.40	1.66
					17.01%	Circle	85% rpm	14,869	43.4	32.7	1.5	3,357	0.13	9.71	1.40	0.40	6.55
				FCLP	17.97%	Approach	85% rpm	15,711	45.9	34.5	2.9	3,357	0.13	9.71	1.40	0.40	6.55
					17.97%	Climbout	IRP	15,711	45.9	34.5	0.3	10,986	0.12	34.94	0.69	0.40	1.66
					17.97%	Circle	85% rpm	15,711	45.9	34.5	3.0	3,357	0.13	9.71	1.40	0.40	6.55
				GCA Box	1.74%	Approach	85% rpm	1,523	4.4	3.3	4.0	3,357	0.13	9.71	1.40	0.40	6.55
					1.74%	Climbout	IRP	1,523	4.4	3.3	0.7	10,986	0.12	34.94	0.69	0.40	1.66
					1.74%	Circle	85% rpm	1,523	4.4	3.3	4.0	3,357	0.13	9.71	1.40	0.40	6.55
				ACLS	0.68%	Approach	85% rpm	592	1.7	1.3	2.9	3,357	0.13	9.71	1.40	0.40	6.55
					0.68%	Climbout	IRP	592	1.7	1.3	0.3	10,986	0.12	34.94	0.69	0.40	1.66
					0.68%	Circle	85% rpm	592	1.7	1.3	3.0	3,357	0.13	9.71	1.40	0.40	6.55
Phase 1 F/A-18E/F total below 3,000 feet										87,410	255.0	192.0					
										100.00%							

TABLE E-30. DATA USED TO ESTIMATE EMISSIONS FROM ADDED F/A-18E/F AIR OPERATIONS

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Aircraft Type	Number of Engines	Engine Models Used For Emissions Analysis	Annual Flight Operations	Flight Activity	Fraction of Annual Flight Operations	Engine Power or Thrust Setting	Average Daily Flight Operations			Time In Mode (minutes)	Fuel Flow Rate per Engine (lb/hr)	Modal Emission Rate (pounds per 1,000 pounds fuel flow)									
							Total Annual Flight Operations	Flight Operations				Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Dioxide						
								Fall	Spring							Winter					
F/A-18E/F (NAS LEMOORE, PHASE 2) [92 ACFT]	2	F414-GE-400 F404-GE-400 GTC 36-200	87,410	Departure	12.60%	APU Use Checks Taxi Out AB Takeoff NoAB Takeoff Climbout	On G Idle G Idle Max AB IRP IRP	11,010 11,010 11,010 11,010 0 11,010	32.1 32.1 32.1 32.1 0 32.1	24.2 24.2 24.2 24.2 0 24.2	2.5 12.0 5.9 0.4 0.5 0.7	197 749 749 35,603 10,986 10,986	0.25 54.20 54.20 4.72 0.12 0.12	6.25 3.29 3.29 9.47 34.94 34.94	2.00 88.85 88.85 262.12 0.69 0.69	0.40 0.40 0.40 0.40 0.40 0.40	0.22 12.79 17.79 0.29 1.66 1.66				
	Arrival				2.40%	Straight In	85% rpm	2,100	6.1	4.6	1.6	3,357	0.13	9.71	1.40	0.40	6.55				
					10.19%	Overhead In	85% rpm	8,910	26.0	19.6	2.9	3,357	0.13	9.71	1.40	0.40	6.55				
					12.60%	Taxi In	G Idle	11,010	32.1	24.2	5.9	749	54.20	3.29	88.85	0.40	12.79				
					10.08%	Hot Refuel	G Idle	8,808	25.7	19.4	11.0	749	54.20	3.29	88.85	0.40	12.79				
	Touch-and-Go					17.01%	Approach	85% rpm	14,869	43.4	32.7	1.5	3,357	0.13	9.71	1.40	0.40	6.55			
						17.01%	Climbout	IRP	14,869	43.4	32.7	0.3	10,986	0.12	34.94	0.69	0.40	1.66			
						17.01%	Circle	85% rpm	14,869	43.4	32.7	1.5	3,357	0.13	9.71	1.40	0.40	6.55			
	FCLP					17.97%	Approach	85% rpm	15,711	45.9	34.5	2.9	3,357	0.13	9.71	1.40	0.40	6.55			
						17.97%	Climbout	IRP	15,711	45.9	34.5	0.3	10,986	0.12	34.94	0.69	0.40	1.66			
							17.97%	Circle	85% rpm	15,711	45.9	34.5	3.0	3,357	0.13	9.71	1.40	0.40	6.55		
GCA Box							1.74%	Approach	85% rpm	1,523	4.4	3.3	4.0	3,357	0.13	9.71	1.40	0.40	6.55		
							1.74%	Climbout	IRP	1,523	4.4	3.3	0.7	10,986	0.12	34.94	0.69	0.40	1.66		
						1.74%	Circle	85% rpm	1,523	4.4	3.3	4.0	3,357	0.13	9.71	1.40	0.40	6.55			
						ACLS	0.68%	Approach	85% rpm	592	1.7	1.3	2.9	3,357	0.13	9.71	1.40	0.40	6.55		
							0.68%	Climbout	IRP	592	1.7	1.3	0.3	10,986	0.12	34.94	0.69	0.40	1.66		
						0.68%	Circle	85% rpm	592	1.7	1.3	3.0	3,357	0.13	9.71	1.40	0.40	6.55			
						NAS Lemoore Phase 2 net change below 3,000 feet												100.00%	87,410	255.0	192.0

TABLE E-30. DATA USED TO ESTIMATE EMISSIONS FROM ADDED F/A-18E/F AIR OPERATIONS

Aircraft Type	Number of Engines	Engine Models Used For Emissions Analysis	Annual Flight Operations	Flight Activity	Fraction of Annual Flight Operations	Engine Power or Thrust Setting	Flight Mode	Average Daily Flight Operations			Time In Mode (minutes)	Engine Fuel Flow Rate per (lb/hr)	Modal Emission Rate (pounds per 1,000 pounds fuel flow)								
								Total Annual Flight Operations	Fall	Spring			Winter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Particulate Oxides				
F/A-18E/F (NAF EL CENTRO TOTAL) [164 ACFT]	2	F414-GE-400 F404-GE-400 GTC 36-200	113,486	Departure	13.80%	On	APU Use	15,660	45.7	34.4	2.5	197	0.25	6.25	2.00	0.40	0.22				
								15,660	45.7	34.4	12.0	749	54.20	3.29	88.85	0.40	12.79				
								15,660	45.7	34.4	5.9	749	54.20	3.29	88.85	0.40	17.79				
								15,660	45.7	34.4	0.4	35,603	4.72	9.47	262.12	0.40	0.29				
								0	0.0	0.0	0.5	10,986	0.12	34.94	0.69	1.66					
								15,660	45.7	34.4	0.7	10,986	0.12	34.94	0.69	0.40	1.66				
								Arrival				2,852	8.3	6.3	1.6	3,357	0.13	9.71	1.40	0.40	6.55
								12,808	37.4	28.1	2.9	3,357	0.13	9.71	1.40	0.40	6.55				
								15,660	45.7	34.4	5.9	749	54.20	3.29	88.85	0.40	12.79				
								12,528	36.6	27.5	11.0	749	54.20	3.29	88.85	0.40	12.79				
Touch-and-Go					14.34%	85% rpm	Approach	16,272	47.5	35.8	1.5	3,357	0.13	9.71	1.40	0.40	6.55				
								16,272	47.5	35.8	0.3	10,986	0.12	34.94	0.69	0.40	1.66				
								16,272	47.5	35.8	1.5	3,357	0.13	9.71	1.40	0.40	6.55				
								FCLP				22,361	65.3	49.1	2.9	3,357	0.13	9.71	1.40	0.40	6.55
								22,361	65.3	49.1	0.3	10,986	0.12	34.94	0.69	0.40	1.66				
								22,361	65.3	49.1	3.0	3,357	0.13	9.71	1.40	0.40	6.55				
GCA Box					1.52%	85% rpm	Approach	1,730	5.1	3.8	4.0	3,357	0.13	9.71	1.40	0.40	6.55				
								1,730	5.1	3.8	0.7	10,986	0.12	34.94	0.69	0.40	1.66				
								1,730	5.1	3.8	4.0	3,357	0.13	9.71	1.40	0.40	6.55				
ACLS					0.63%	85% rpm	Approach	721	2.1	1.6	2.9	3,357	0.13	9.71	1.40	0.40	6.55				
								721	2.1	1.6	0.3	10,986	0.12	34.94	0.69	0.40	1.66				
								721	2.1	1.6	3.0	3,357	0.13	9.71	1.40	0.40	6.55				
NAF E1 Centro F/A-18E/F Phase 2 total below 3,000 feet								113,486	331.4	249.4											

## Notes:

APU = auxiliary power unit (for electrical power and air conditioning prior to start of main engines)

Checks = preflight engine and component checks

FLCP = field carrier landing practice

GCA = ground controlled approach

ACLS = automatic carrier landing system

G Idle = ground idle

AB = afterburner

IRP = intermediate rated power (equivalent to military power setting)

Annual flight operation estimates for F/A-18E/F aircraft provided by Navy personnel.

Departures and arrivals each represent a single flight operation; pattern events (T&G, FLCP, GCA box, ACLS) each represent two flight operations (an approach and a climbout).

Flight operation totals and subtotals are the sum of approach mode and climbout mode numbers.

Time-in-mode estimates for F/A-18 operations below 3,000 feet based on Thompson (1997) and U.S. Environmental Protection Agency (1985; 1992).

Engine power setting assumptions based on data from Navy Aircraft Environmental Support Office (AESO) personnel, NAS Lemoore personnel, and U.S. Environmental Protection Agency (1985; 1992).

F/A-18E/F and F/A-18C/D takeoffs assume 100% maximum afterburner use for departures and no afterburner use for touch-and-go, FLCP, or GCA patterns (per Lt. Thompson, E/F FIT).

APU engine emission rates based on data from Coffey (1997), assuming maximum power output (per U.S. Environmental Protection Agency 1992).

APU engines shut off automatically 1 minute after start-up of the main aircraft engines (per Lt. Thompson, E/F FIT).

Hot refueling (refueling while engines are idling) assumed to occur for 80% of aircraft arrivals (per E/F FIT).

Aircraft engine emission rates are based on data from U.S. Navy (1990; 1997).

F/A-18C/D aircraft approach mode fuel use and emission rates are from U.S. Navy (1990), using a 46% thrust power setting (per Lyn Coffey, AESO); approach mode power settings, fuel use rates, and emission factors in U.S. Environmental Protection Agency (1992) are considered erroneous.

PM10 emission rates taken from AESO Report 9725A for F/A-18E/F and from AESO Report 6-90 for F/A-18C/D; the afterburner PM10 rates are extrapolated using curve fit functions derived from PM10 emission factors versus engine thrust values for non-afterburner settings, based on afterburner thrust of 16,500 pounds for F/A-18E/F and 15,254 pounds for F/A-18C/D.

F/A-18 aircraft taxi/idle data assume 100% ground idle conditions (per E/F FIT).

Sulfur oxide emission rates are based on 0.02% fuel sulfur content and 100% conversion to sulfur oxides as recommended by AESO Report 6-90.

Phase 2 fleet squadron F/A-18E/F aircraft at NAS Lemoore will be replacements for F/A-18C/D aircraft currently based at NAS Lemoore.

Phase 2 fleet squadron F/A-18E/F aircraft at MAF El Centro will be additional new aircraft.

Typical day operations assume 80% of annual operations during spring through fall (274 days) and 20% of annual operations during winter (91 days).

All values independently rounded for display after calculation.

## Data Sources:

Thompson, S. 1997. 7-18-97 E-Mail memo from Lt. Thompson, E/F FIT, NAS Lemoore re. best estimates for time-in-mode values, F/A-18 E/F aircraft.

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U.S. Navy. 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).

U.S. Navy. 1997. Gaseous and Particulate Emission Indexes for the F414 Turbofan Engine - Draft - Revised. (AESO Memo Report No. 9725A.).

U.S. Environmental Protection Agency. 1992. Procedures for Emission Inventory Preparation. Volume IV: Mobile Sources (EPA-450/4-81-026d(revised)).

U.S. Environmental Protection Agency. 1985. Compilation of Air Pollutant Emission Factors. Volume II (AP-42).

TABLE E-31. ESTIMATED EMISSIONS FROM ADDED F/A-18E/F AIR OPERATIONS

Air- craft Type	Flight Activity	Flight Mode	Average Daily Summer Emissions (pounds/day)					Average Daily Winter Emissions (pounds/day)					Total Emissions from Annual Flight Operations (tons/year)				
			Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter
F/A-18E/F (FRS) [36 ACFT]	Departure	APU Use	0.1	2.2	0.7	0.1	0.1	0.1	1.7	0.5	0.1	0.1	0.02	0.38	0.12	0.02	0.01
	Checks		350.7	21.3	575.0	2.6	82.8	263.1	16.0	431.2	1.9	62.1	60.02	3.64	98.40	0.44	14.16
	Taxi Out		172.5	10.5	282.7	1.3	56.6	129.3	7.9	212.0	1.0	42.5	29.51	1.79	48.38	0.22	9.69
	AB Takeoff		48.4	97.1	2,687.7	4.1	3.0	36.3	72.8	2,015.8	3.1	2.3	8.28	16.62	459.96	0.70	0.51
	NoAB Takeoff		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00
Arrival	Climbout		0.7	193.5	3.8	2.2	9.2	0.5	145.1	2.9	1.7	6.9	0.11	33.11	0.65	0.38	1.57
	Straight In		0.1	7.6	1.1	0.3	5.2	0.1	5.7	0.8	0.2	3.9	0.02	1.32	0.19	0.05	0.89
	Overhead In		0.7	54.2	7.8	2.2	36.6	0.5	40.6	5.9	1.7	27.4	0.12	9.26	1.34	0.38	6.25
	Taxi In		172.5	10.5	282.7	1.3	40.7	129.3	7.9	212.0	1.0	30.5	29.51	1.79	48.38	0.22	6.96
	Hot Refuel		257.5	15.6	422.1	1.9	60.8	193.5	11.7	317.2	1.4	45.7	44.02	2.67	72.16	0.32	10.39
Touch- and-Go	Approach		0.9	65.5	9.4	2.7	44.2	0.7	49.4	7.1	2.0	33.3	0.15	11.23	1.62	0.46	7.57
	Climbout		0.5	154.3	3.0	1.8	7.3	0.4	116.3	2.3	1.3	5.5	0.09	26.44	0.52	0.30	1.26
	Circle		0.9	65.5	9.4	2.7	44.2	0.7	49.4	7.1	2.0	33.3	0.15	11.23	1.62	0.46	7.57
FCLP	Approach		1.3	97.1	14.0	4.0	65.5	1.0	73.1	10.5	3.0	49.3	0.22	16.60	2.39	0.68	11.20
	Climbout		0.4	118.2	2.3	1.4	5.6	0.3	89.1	1.8	1.0	4.2	0.07	20.23	0.40	0.23	0.96
	Circle		1.3	100.4	14.5	4.1	67.7	1.0	75.6	10.9	3.1	51.0	0.23	17.18	2.48	0.71	11.59
GCA Box	Approach		0.2	17.4	2.5	0.7	11.7	0.2	13.0	1.9	0.5	8.8	0.04	2.96	0.43	0.12	2.00
	Climbout		0.1	35.8	0.7	0.4	1.7	0.1	26.9	0.5	0.3	1.3	0.02	6.10	0.12	0.07	0.29
	Circle		0.2	17.4	2.5	0.7	11.7	0.2	13.0	1.9	0.5	8.8	0.04	2.96	0.43	0.12	2.00
ACLS	Approach		0.1	4.4	0.6	0.2	3.0	0.0	3.5	0.5	0.1	2.3	0.01	0.78	0.11	0.03	0.52
	Climbout		0.0	5.4	0.1	0.1	0.3	0.0	4.2	0.1	0.0	0.2	0.00	0.94	0.02	0.01	0.04
	Circle		0.1	4.6	0.7	0.2	3.1	0.0	3.6	0.5	0.1	2.4	0.01	0.80	0.12	0.03	0.54
FRS squadron below 3,000 feet			1,009.2	1,098.4	4,323.5	35.0	560.8	757.3	826.5	3,243.5	26.3	421.7	172.7	188.0	739.8	6.0	96.0

TABLE E-31. ESTIMATED EMISSIONS FROM ADDED F/A-18E/F AIR OPERATIONS

Air- craft Type	Flight Activity	Flight Mode	Average Daily Summer Emissions (pounds/day)					Average Daily Winter Emissions (pounds/day)					Total Emissions from Annual Flight Operations (tons/year)				
			Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter
F/A-18E/F (FLEET, PHASE 1) [56 ACFT]	Departure	APU Use	0.0	1.1	0.3	0.1	0.0	0.0	0.8	0.3	0.1	0.0	0.01	0.19	0.06	0.01	0.01
	Checks		172.1	10.4	282.2	1.3	40.6	128.3	7.8	210.3	0.9	30.3	29.37	1.78	48.14	0.22	6.93
	Taxi Out		84.6	5.1	138.7	0.6	27.8	63.1	3.8	103.4	0.5	20.7	14.44	0.88	23.67	0.11	4.74
	AB Takeoff		23.8	47.7	1,319.0	2.0	1.5	17.7	35.5	983.0	1.5	1.1	4.05	8.13	225.03	0.34	0.25
	NoAB Takeoff		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00
	Climbout		0.3	94.9	1.9	1.1	4.5	0.2	70.8	1.4	0.8	3.4	0.06	16.20	0.32	0.19	0.77
Arrival	Straight In		0.0	3.0	0.4	0.1	2.0	0.0	2.3	0.3	0.1	1.5	0.01	0.51	0.07	0.02	0.34
	Overhead In		0.4	28.0	4.0	1.2	18.9	0.3	21.1	3.0	0.9	14.2	0.06	4.78	0.69	0.20	3.22
	Taxi In		84.6	5.1	138.7	0.6	20.0	63.1	3.8	103.4	0.5	14.9	14.44	0.88	23.67	0.11	3.41
	Hot Refuel		125.0	7.6	205.0	0.9	29.5	95.3	5.8	156.2	0.7	22.5	21.54	1.31	35.30	0.16	5.08
Touch- and-Go	Approach		0.1	5.2	0.8	0.2	3.5	0.1	3.9	0.6	0.2	2.6	0.01	0.89	0.13	0.04	0.60
	Climbout		0.0	12.3	0.2	0.1	0.6	0.0	9.2	0.2	0.1	0.4	0.01	2.09	0.04	0.02	0.10
	Circle		0.1	5.2	0.8	0.2	3.5	0.1	3.9	0.6	0.2	2.6	0.01	0.89	0.13	0.04	0.60
FCLP	Approach		0.6	47.6	6.9	2.0	32.1	0.5	35.9	5.2	1.5	24.2	0.11	8.15	1.17	0.34	5.50
	Climbout		0.2	58.0	1.1	0.7	2.8	0.2	43.8	0.9	0.5	2.1	0.03	9.93	0.20	0.11	0.47
	Circle		0.7	49.2	7.1	2.0	33.2	0.5	37.2	5.4	1.5	25.1	0.11	8.43	1.22	0.35	5.69
GCA Box	Approach		0.0	2.2	0.3	0.1	1.5	0.0	1.7	0.3	0.1	1.2	0.00	0.35	0.05	0.01	0.24
	Climbout		0.0	4.5	0.1	0.1	0.2	0.0	3.6	0.1	0.0	0.2	0.00	0.72	0.01	0.01	0.03
	Circle		0.0	2.2	0.3	0.1	1.5	0.0	1.7	0.3	0.1	1.2	0.00	0.35	0.05	0.01	0.24
ACLS	Approach		0.0	0.9	0.1	0.0	0.6	0.0	0.6	0.1	0.0	0.4	0.00	0.16	0.02	0.01	0.11
	Climbout		0.0	1.2	0.0	0.0	0.1	0.0	0.8	0.0	0.0	0.0	0.00	0.19	0.00	0.00	0.01
	Circle		0.0	1.0	0.1	0.0	0.7	0.0	0.7	0.1	0.0	0.4	0.00	0.16	0.02	0.01	0.11
Fleet1 squadrons below 3,000 ft			492.7	392.4	2,108.1	13.4	225.0	369.3	294.7	1,574.8	10.1	169.1	84.3	67.0	360.0	2.3	38.4

TABLE E-31. ESTIMATED EMISSIONS FROM ADDED F/A-18E/F AIR OPERATIONS

Air- craft Type	Flight Activity	Flight Mode	Average Daily Summer Emissions (pounds/day)					Average Daily Winter Emissions (pounds/day)					Total Emissions from Annual Flight Operations (tons/year)				
			Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter
F/A-18E/F (FLEET, PHASE 2) [72 ACFT]	Departure	APU Use	0.1	1.4	0.4	0.1	0.0	0.0	1.0	0.3	0.1	0.0	0.01	0.24	0.08	0.02	0.01
	Checks		220.8	13.4	362.0	1.6	52.1	165.6	10.1	271.5	1.2	39.1	37.75	2.29	61.89	0.28	8.91
	Taxi Out		108.6	6.6	178.0	0.8	35.6	81.4	4.9	133.5	0.6	26.7	18.56	1.13	30.43	0.14	6.09
	AB Takeoff		30.5	61.1	1,692.2	2.6	1.9	22.9	45.9	1,269.2	1.9	1.4	5.21	10.45	289.30	0.44	0.32
	NoAB Takeoff		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00
Arrival	Climbout		0.4	121.8	2.4	1.4	5.8	0.3	91.4	1.8	1.0	4.3	0.07	20.82	0.41	0.24	0.99
	Straight In		0.1	3.8	0.6	0.2	2.6	0.0	3.0	0.4	0.1	2.0	0.01	0.65	0.09	0.03	0.44
	Overhead In		0.5	35.9	5.2	1.5	24.2	0.4	27.1	3.9	1.1	18.3	0.08	6.14	0.89	0.25	4.14
	Taxi In		108.6	6.6	178.0	0.8	25.6	81.4	4.9	133.5	0.6	19.2	18.56	1.13	30.43	0.14	4.38
	Hot Refuel		162.2	9.8	266.0	1.2	38.3	122.1	7.4	200.1	0.9	28.8	27.69	1.68	45.39	0.20	6.53
Touch- and-Go	Approach		0.1	6.7	1.0	0.3	4.5	0.1	5.1	0.7	0.2	3.4	0.02	1.14	0.16	0.05	0.77
	Climbout		0.1	15.7	0.3	0.2	0.7	0.0	11.9	0.2	0.1	0.6	0.01	2.69	0.05	0.03	0.13
	Circle		0.1	6.7	1.0	0.3	4.5	0.1	5.1	0.7	0.2	3.4	0.02	1.14	0.16	0.05	0.77
FCLP	Approach		0.8	61.1	8.8	2.5	41.2	0.6	46.0	6.6	1.9	31.0	0.14	10.48	1.51	0.43	7.07
	Climbout		0.3	74.5	1.5	0.9	3.5	0.2	56.0	1.1	0.6	2.7	0.04	12.76	0.25	0.15	0.61
	Circle		0.8	63.2	9.1	2.6	42.7	0.6	47.6	6.9	2.0	32.1	0.15	10.84	1.56	0.45	7.31
GCA Box	Approach		0.0	2.6	0.4	0.1	1.8	0.0	2.2	0.3	0.1	1.5	0.01	0.45	0.06	0.02	0.30
	Climbout		0.0	5.4	0.1	0.1	0.3	0.0	4.5	0.1	0.1	0.2	0.00	0.93	0.02	0.01	0.04
	Circle		0.0	2.6	0.4	0.1	1.8	0.0	2.2	0.3	0.1	1.5	0.01	0.45	0.06	0.02	0.30
ACLS	Approach		0.0	1.3	0.2	0.1	0.9	0.0	0.9	0.1	0.0	0.6	0.00	0.20	0.03	0.01	0.14
	Climbout		0.0	1.5	0.0	0.0	0.1	0.0	1.2	0.0	0.0	0.1	0.00	0.25	0.00	0.00	0.01
	Circle		0.0	1.3	0.2	0.1	0.9	0.0	1.0	0.1	0.0	0.7	0.00	0.21	0.03	0.01	0.14
Fleet2 squadrons below 3,000 ft			634.0	503.1	2,707.7	17.2	289.0	475.9	379.2	2,031.6	13.0	217.6	108.3	86.1	462.8	2.9	49.4

TABLE E-31. ESTIMATED EMISSIONS FROM ADDED F/A-18E/F AIR OPERATIONS

Air- craft Type	Flight Activity	Flight Mode	Average Daily Summer Emissions (pounds/day)						Average Daily Winter Emissions (pounds/day)						Total Emissions from Annual Flight Operations (tons/year)					
			Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter			
F/A-18C/D (REPLACED FLEET, PHASE 2) [72 ACFT]	Departure	APU Use	0.1	1.4	0.4	0.1	0.0	0.0	1.0	0.3	0.1	0.0	0.0	0.24	0.08	0.02	0.01			
	Checks		197.5	3.9	466.1	1.4	42.0	148.1	3.0	349.6	1.0	31.5	33.76	0.67	79.69	0.23	7.18			
	Taxi Out		97.1	1.9	229.2	0.7	20.7	72.8	1.5	171.9	0.5	15.5	16.60	0.33	39.18	0.11	3.53			
	AB Takeoff		0.7	47.5	119.1	2.1	14.5	0.5	35.6	89.3	1.5	10.9	0.11	8.12	20.35	0.35	2.47			
	NoAB Takeoff		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00			
	Climbout		0.8	68.6	2.9	1.1	7.7	0.6	51.4	2.1	0.8	5.7	0.14	11.72	0.49	0.19	1.31			
Arrival	Straight In		0.2	3.9	0.8	0.2	2.9	0.2	3.0	0.6	0.1	2.2	0.04	0.67	0.14	0.03	0.49			
	Overhead In		1.9	36.9	7.9	1.8	26.9	1.5	27.9	5.9	1.3	20.3	0.33	6.32	1.34	0.30	4.60			
	Taxi In		97.1	1.9	229.2	0.7	20.7	72.8	1.5	171.9	0.5	15.5	16.60	0.33	39.18	0.11	3.53			
	Hot Refuel		145.1	2.9	342.5	1.0	30.9	109.1	2.2	257.6	0.8	23.2	24.76	0.49	58.44	0.17	5.27			
Touch- and-Go	Approach		0.4	6.9	1.5	0.3	5.0	0.3	5.2	1.1	0.2	3.8	0.06	1.18	0.25	0.06	0.86			
	Climbout		0.1	8.9	0.4	0.1	1.0	0.1	6.7	0.3	0.1	0.7	0.02	1.52	0.06	0.02	0.17			
	Circle		0.4	6.9	1.5	0.3	5.0	0.3	5.2	1.1	0.2	3.8	0.06	1.18	0.25	0.06	0.86			
FCLP	Approach		3.3	62.9	13.4	3.0	45.8	2.5	47.3	10.1	2.3	34.5	0.57	10.77	2.29	0.51	7.85			
	Climbout		0.5	41.9	1.7	0.7	4.7	0.4	31.5	1.3	0.5	3.5	0.09	7.18	0.30	0.11	0.80			
	Circle		3.4	65.0	13.8	3.1	47.4	2.6	48.9	10.4	2.3	35.7	0.59	11.15	2.37	0.53	8.12			
GCA Box	Approach		0.1	2.7	0.6	0.1	2.0	0.1	2.2	0.5	0.1	1.6	0.02	0.46	0.10	0.02	0.34			
	Climbout		0.0	3.0	0.1	0.0	0.3	0.0	2.5	0.1	0.0	0.3	0.01	0.52	0.02	0.01	0.06			
	Circle		0.1	2.7	0.6	0.1	2.0	0.1	2.2	0.5	0.1	1.6	0.02	0.46	0.10	0.02	0.34			
ACLS	Approach		0.1	1.3	0.3	0.1	0.9	0.1	1.0	0.2	0.0	0.7	0.01	0.21	0.04	0.01	0.15			
	Climbout		0.0	0.9	0.0	0.0	0.1	0.0	0.6	0.0	0.0	0.1	0.00	0.14	0.01	0.00	0.02			
	Circle		0.1	1.3	0.3	0.1	1.0	0.1	1.0	0.2	0.0	0.7	0.01	0.22	0.05	0.01	0.16			
Replaced C/Ds below 3,000 ft			549.0	373.3	1,432.1	16.9	281.3	412.1	281.5	1,075.1	12.7	211.9	93.8	63.9	244.7	2.9	48.1			

TABLE E-31. ESTIMATED EMISSIONS FROM ADDED F/A-18E/F AIR OPERATIONS

Air- craft Type	Flight Activity	Flight Mode	Average Daily Summer Emissions (pounds/day)					Average Daily Winter Emissions (pounds/day)					Total Emissions from Annual Flight Operations (tons/year)				
			Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter
F/A-18E/F (PHASE 1 TOTALS) [92 ACFT]	Departure	APU Use															
	Checks		0.1	3.3	1.1	0.2	0.1	0.1	2.5	0.8	0.2	0.1	0.02	0.56	0.18	0.04	0.02
	Taxi Out		522.9	31.7	857.1	3.9	123.4	391.3	23.8	641.5	2.9	92.3	89.39	5.43	146.54	0.66	21.09
	AB Takeoff		257.1	15.6	421.4	1.9	84.4	192.4	11.7	315.4	1.4	63.2	43.95	2.67	72.05	0.32	14.43
F/A-18E/F (PHASE 1 TOTALS) [92 ACFT]	MoAB Takeoff		72.1	144.8	4,006.6	6.1	4.5	54.0	108.3	2,998.8	4.6	3.4	12.33	24.75	684.99	1.05	0.77
	Climbout		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00
			1.0	288.4	5.7	3.3	13.7	0.7	215.9	4.3	2.5	10.3	0.17	49.31	0.97	0.56	2.34
Arrival	Straight In		0.1	10.6	1.5	0.4	7.2	0.1	8.0	1.2	0.3	5.4	0.02	1.83	0.26	0.08	1.23
	Overhead In		1.1	82.2	11.9	3.4	55.5	0.8	61.8	8.9	2.5	41.7	0.19	14.04	2.02	0.58	9.47
	Taxi In		257.1	15.6	421.4	1.9	60.7	192.4	11.7	315.4	1.4	45.4	43.95	2.67	72.05	0.32	10.37
	Hot Refuel		382.5	23.2	627.1	2.8	90.3	288.8	17.5	473.4	2.1	68.1	65.55	3.98	107.46	0.48	15.47
Touch- and-Go	Approach		0.9	70.7	10.2	2.9	47.7	0.7	53.3	7.7	2.2	36.0	0.16	12.12	1.75	0.50	8.17
	Climbout		0.6	166.6	3.3	1.9	7.9	0.4	125.5	2.5	1.4	6.0	0.10	28.54	0.56	0.33	1.36
	Circle		0.9	70.7	10.2	2.9	47.7	0.7	53.3	7.7	2.2	36.0	0.16	12.12	1.75	0.50	8.17
FCLP	Approach		1.9	144.6	20.9	6.0	97.6	1.5	109.0	15.7	4.5	73.5	0.33	24.75	3.57	1.02	16.70
	Climbout		0.6	176.2	3.5	2.0	8.4	0.5	132.8	2.6	1.5	6.3	0.10	30.15	0.60	0.35	1.43
	Circle		2.0	149.6	21.6	6.2	100.9	1.5	112.8	16.3	4.6	76.1	0.34	25.61	3.69	1.05	17.27
GCA Box	Approach		0.3	19.6	2.8	0.8	13.2	0.2	14.8	2.1	0.6	10.0	0.04	3.31	0.48	0.14	2.23
	Climbout		0.1	40.3	0.8	0.5	1.9	0.1	30.5	0.6	0.3	1.4	0.02	6.82	0.13	0.08	0.32
	Circle		0.3	19.6	2.8	0.8	13.2	0.2	14.8	2.1	0.6	10.0	0.04	3.31	0.48	0.14	2.23
ACLS	Approach		0.1	5.4	0.8	0.2	3.6	0.1	4.1	0.6	0.2	2.8	0.01	0.93	0.13	0.04	0.63
	Climbout		0.0	6.5	0.1	0.1	0.3	0.0	5.0	0.1	0.1	0.2	0.00	1.14	0.02	0.01	0.05
	Circle		0.1	5.5	0.8	0.2	3.7	0.1	4.2	0.6	0.2	2.9	0.01	0.96	0.14	0.04	0.65
F/A-18E/F Phase 1 below 3,000 ft			1,501.9	1,490.8	6,431.6	48.4	785.8	1,126.6	1,121.1	4,818.2	36.4	590.8	256.9	255.0	1,099.8	8.3	134.4

TABLE E-31. ESTIMATED EMISSIONS FROM ADDED F/A-18E/F AIR OPERATIONS

Air- craft Type	Flight Activity	Flight Mode	Average Daily Summer Emissions (pounds/day)					Average Daily Winter Emissions (pounds/day)					Total Emissions from Annual Flight Operations (tons/year)				
			Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter
F/A-18E/F (NAS LEMOORE, PHASE 2) [92 ACFT]	Departure	APU Use	0.1	3.3	1.1	0.2	0.1	0.1	2.5	0.8	0.2	0.1	0.02	0.56	0.18	0.04	0.02
	Checks		546.3	41.2	753.0	4.1	133.5	408.9	30.9	563.4	3.1	99.9	93.39	7.04	128.74	0.71	22.82
	Taxi Out		268.6	20.3	370.2	2.0	99.4	201.0	15.2	277.0	1.5	74.4	45.92	3.46	63.30	0.35	16.99
	AB Takeoff		102.0	158.4	5,579.8	6.6	(8.1)	76.4	118.6	4,178.7	5.0	(6.1)	17.43	27.08	953.94	1.13	(1.38)
	NoAB Takeoff		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00
	Climbout		0.6	341.6	5.2	3.6	11.8	0.4	255.8	3.9	2.7	8.9	0.10	58.41	0.90	0.62	2.02
	Arrival	Straight In	(0.0)	10.5	1.2	0.4	6.9	(0.0)	7.9	0.9	0.3	5.2	(0.00)	1.81	0.21	0.07	1.18
		Overhead In	(0.4)	81.2	9.2	3.1	52.8	(0.3)	61.0	6.9	2.3	39.6	(0.06)	13.86	1.57	0.53	9.01
		Taxi In	268.6	20.3	370.2	2.0	65.6	201.0	15.2	277.0	1.5	49.1	45.92	3.46	63.30	0.35	11.22
		Hot Refuel	399.7	30.2	550.6	3.0	97.7	301.7	22.8	415.8	2.3	73.7	68.48	5.17	94.41	0.52	16.73
Touch- and-Go	Approach		0.7	70.5	9.7	2.9	47.2	0.5	53.2	7.3	2.2	35.6	0.12	12.08	1.66	0.49	8.09
	Climbout		0.5	173.5	3.2	1.9	7.7	0.4	130.7	2.4	1.5	5.8	0.09	29.71	0.55	0.33	1.31
	Circle		0.7	70.5	9.7	2.9	47.2	0.5	53.2	7.3	2.2	35.6	0.12	12.08	1.66	0.49	8.09
FCLP	Approach		(0.5)	142.9	16.3	5.5	93.0	(0.4)	107.7	12.3	4.1	70.1	(0.09)	24.46	2.79	0.94	15.91
	Climbout		0.3	208.7	3.2	2.2	7.2	0.3	157.3	2.4	1.7	5.4	0.06	35.73	0.55	0.38	1.24
	Circle		(0.6)	147.8	16.9	5.7	96.2	(0.4)	111.4	12.7	4.3	72.5	(0.10)	25.30	2.88	0.97	16.46
GCA Box	Approach		0.2	19.5	2.6	0.8	13.0	0.1	14.7	2.0	0.6	9.8	0.03	3.30	0.44	0.13	2.20
	Climbout		0.1	42.7	0.8	0.5	1.8	0.1	32.4	0.6	0.4	1.4	0.02	7.23	0.13	0.08	0.31
	Circle		0.2	19.5	2.6	0.8	13.0	0.1	14.7	2.0	0.6	9.8	0.03	3.30	0.44	0.13	2.20
ACLS	Approach		0.0	5.3	0.7	0.2	3.5	0.0	4.1	0.5	0.2	2.7	0.00	0.93	0.12	0.04	0.61
	Climbout		0.0	7.2	0.1	0.1	0.3	0.0	5.5	0.1	0.1	0.2	0.00	1.24	0.02	0.01	0.05
	Circle		0.0	5.5	0.7	0.2	3.6	0.0	4.2	0.5	0.2	2.8	0.00	0.96	0.12	0.04	0.64
NASL P2 F/A-18E/F below 3,000 ft			1,587.0	1,620.7	7,707.2	48.7	793.4	1,190.4	1,218.8	5,774.7	36.6	596.5	271.5	277.2	1,317.9	8.3	135.7

TABLE E-31. ESTIMATED EMISSIONS FROM ADDED F/A-18E/F AIR OPERATIONS

Air- craft Type	Flight Activity	Flight Mode	Average Daily Summer Emissions (pounds/day)					Average Daily Winter Emissions (pounds/day)					Total Emissions from Annual Flight Operations (tons/year)				
			Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter
F/A-18E/F (NAF EL CENTRO TOTAL) [164 ACFT]	Departure	APU Use	0.2	4.7	1.5	0.3	0.2	0.1	3.5	1.1	0.2	0.1	0.03	0.80	0.26	0.05	0.03
	Checks		742.1	45.0	1,216.5	5.5	175.1	558.6	33.9	915.7	4.1	131.8	127.15	7.72	208.43	0.94	30.00
	Taxi Out		364.9	22.1	598.1	2.7	119.8	274.6	16.7	450.2	2.0	90.1	62.51	3.79	102.48	0.46	20.52
	AB Takeoff		102.4	205.4	5,686.5	8.7	6.4	77.1	154.6	4,280.4	6.5	4.8	17.54	35.20	974.29	1.49	1.09
	NoAB Takeoff Climbout		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00
Arrival			1.4	409.3	8.1	4.7	19.4	1.1	308.1	6.1	3.5	14.6	0.24	70.13	1.38	0.80	3.33
	Straight In		0.2	14.4	2.1	0.6	9.7	0.1	11.0	1.6	0.5	7.4	0.03	2.48	0.36	0.10	1.67
	Overhead In		1.6	117.8	17.0	4.9	79.5	1.2	88.5	12.8	3.6	59.7	0.27	20.18	2.91	0.83	13.61
	Taxi In		364.9	22.1	598.1	2.7	86.1	274.6	16.7	450.2	2.0	64.8	62.51	3.79	102.48	0.46	14.75
	Hot Refuel		544.8	33.1	893.1	4.0	128.6	409.3	24.8	671.0	3.0	96.6	93.24	5.66	152.85	0.69	22.00
Touch- and-go	Approach		1.0	77.4	11.2	3.2	52.2	0.8	58.3	8.4	2.4	39.4	0.18	13.26	1.91	0.55	8.94
	Climbout		0.6	182.3	3.6	2.1	8.7	0.5	137.4	2.7	1.6	6.5	0.11	31.23	0.62	0.36	1.48
	Circle		1.0	77.4	11.2	3.2	52.2	0.8	58.3	8.4	2.4	39.4	0.18	13.26	1.91	0.55	8.94
FCLP	Approach		2.8	205.8	29.7	8.5	138.8	2.1	154.7	22.3	6.4	104.4	0.47	35.23	5.08	1.45	23.76
	Climbout		0.9	250.7	4.9	2.9	11.9	0.6	188.5	3.7	2.2	9.0	0.15	42.92	0.85	0.49	2.04
	Circle		2.8	212.9	30.7	8.8	143.6	2.1	160.0	23.1	6.6	108.0	0.49	36.44	5.25	1.50	24.58
GCA Box	Approach		0.3	22.2	3.2	0.9	15.0	0.2	16.5	2.4	0.7	11.1	0.05	3.76	0.54	0.15	2.54
	Climbout		0.2	45.7	0.9	0.5	2.2	0.1	34.0	0.7	0.4	1.6	0.03	7.75	0.15	0.09	0.37
	Circle		0.3	22.2	3.2	0.9	15.0	0.2	16.5	2.4	0.7	11.1	0.05	3.76	0.54	0.15	2.54
ACLS	Approach		0.1	6.6	1.0	0.3	4.5	0.1	5.0	0.7	0.2	3.4	0.02	1.14	0.16	0.05	0.77
	Climbout		0.0	8.1	0.2	0.1	0.4	0.0	6.1	0.1	0.1	0.3	0.00	1.38	0.03	0.02	0.07
	Circle		0.1	6.8	1.0	0.3	4.6	0.1	5.2	0.8	0.2	3.5	0.02	1.17	0.17	0.05	0.79
El Centro Phase 2 below 3,000 ft			2,132.5	1,992.1	9,121.6	65.6	1,073.7	1,604.4	1,498.7	6,864.8	49.3	807.7	365.3	341.1	1,562.7	11.2	183.8

## Notes:

APU = auxiliary power unit (for electrical power and air conditioning prior to start of main engines)

Checks = preflight engine and component checks

FLCP = field carrier landing practice

GCA = ground controlled approach

ACLS = automatic carrier landing system

G Idle = ground idle

AB = afterburner

IRP = intermediate rated power (equivalent to military power setting)

Typical day operations assume 80% of annual operations during spring through fall (274 days) and 20% of annual operations during winter (91 days).

Flight activity and emission rate assumptions are presented in Table E-30.

All values independently rounded for display after calculation.

## Data Sources:

Thompson, S. 1997. 7-18-97 E-Mail memo from Lt. Thompson, E/F FIT, NAS Lemoore re. best estimates for time-in-mode values, F/A-18 E/F aircraft.

Coffer, Lyn P. 1997. 8-4-97 Fax, F/A-18E/F Pilot Responses to Questionnaires and Factory Estimated GTC 36-200 APU Exhaust Emissions.

U.S. Navy. 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).

U.S. Navy. 1997. Gaseous and Particulate Emission Indexes for the F414 Turbofan Engine - Draft - Revised. (AESO Memo Report No. 9725A.).

U.S. Environmental Protection Agency. 1992. Procedures for Emission Inventory Preparation. Volume IV: Mobile Sources (EPA-450/4-81-026d(revised)).

U.S. Environmental Protection Agency. 1985. Compilation of Air Pollutant Emission Factors, Volume II (AP-42).

TABLE E-32. ESTIMATED EMISSIONS FROM IN-FRAME ENGINE MAINTENANCE RUN-UPS FOR ADDED F/A-18E/F AIRCRAFT

Run-Up Type	Engine Models Used For Emissions Analysis	Annual Run-Up Events	Engine Mode	Time In Mode (minutes)	Fuel Flow Rate per Engine (lb/hr)	Modal Emission Rate (pounds per 1,000 pounds fuel flow)					Total Emissions from Annual Engine Run-Ups (tons/year)																							
						Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter																			
Low Power (E/F FRS)	F414-GE-400, F404-GE-400	2,066	G Idle	6.5	749	54.20	3.29	88.85	0.40	12.79	4.54	0.28	7.45	0.03	1.07																			
			85% rpm	3.5	3,357	0.13	9.71	1.40	0.40	6.55	0.03	1.96	0.28	0.08	1.33																			
						Subtotal																												
High Power (E/F FRS)	F414-GE-400, F404-GE-400	115	G Idle	13	749	54.20	3.29	88.85	0.40	12.79	0.51	0.03	0.83	0.00	0.12																			
			85% rpm	8.5	3,357	0.13	9.71	1.40	0.40	6.55	0.00	0.27	0.04	0.01	0.18																			
Low Power (E/F FLEET 1)	F414-GE-400, F404-GE-400	3,214	G Idle	6.5	749	54.20	3.29	88.85	0.40	12.79	7.07	0.43	11.59	0.05	1.67																			
			85% rpm	3.5	3,357	0.13	9.71	1.40	0.40	6.55	0.04	3.06	0.44	0.13	2.06																			
						Subtotal																												
High Power (E/F FLEET 1)	F414-GE-400, F404-GE-400	179	G Idle	13	749	54.20	3.29	88.85	0.40	12.79	0.79	0.05	1.29	0.01	0.19																			
			85% rpm	8.5	3,357	0.13	9.71	1.40	0.40	6.55	0.01	0.41	0.06	0.02	0.28																			
					Subtotal					1.31					4.33					29.28					0.10					0.63				

TABLE E-32. ESTIMATED EMISSIONS FROM IN-FRAME ENGINE MAINTENANCE RUN-UPS FOR ADDED F/A-18E/F AIRCRAFT

Run-Up Type	Engine Models Used For Emissions Analysis	Annual Run-Up Events	Engine Mode	Time In Mode (minutes)	Fuel Flow Rate per Engine (lb/hr)	Modal Emission Rate (pounds per 1,000 pounds fuel flow)					Total Emissions from Annual Engine Run-Ups (tons/year)					
						Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	
Low Power (E/F FLEET 2)	F414-GE-400,	4,133	G Idle	6.5	749	54.20	3.29	88.85	0.40	12.79	9.09	0.55	14.90	0.07	2.14	
	85% rpm		3.5	3,357	0.13	9.71	1.40	0.40	6.55	0.05						3.93
High Power (E/F FLEET 2)	F414-GE-400,	230	G Idle	13	749	54.20	3.29	88.85	0.40	12.79	1.01	0.06	1.66	0.01	0.24	
	85% rpm		8.5	3,357	0.13	9.71	1.40	0.40	6.55	0.01						0.53
Low Power (C/D Fleet 2)	F404-GE-400	4,133	G Idle	6.5	624	58.18	1.16	137.34	0.40	12.38	6.32	0.13	14.92	0.04	1.34	
	85% rpm		3.5	4,005	0.44	8.37	1.78	0.40	6.10	0.17						3.14
High Power (C/D Fleet 2)	F404-GE-400	230	G Idle	13	624	58.18	1.16	137.34	0.40	12.38	0.70	0.01	1.66	0.00	0.15	
	85% rpm		8.5	4,005	0.44	8.37	1.78	0.40	6.10	0.02						0.43

TABLE E-32. ESTIMATED EMISSIONS FROM IN-FRAME ENGINE MAINTENANCE RUN-UPS FOR ADDED F/A-18E/F AIRCRAFT

Run-Up Type	Engine Models Used For Emissions Analysis	Annual Run-Up Events	Engine Mode	Time In Mode (minutes)	Fuel Flow Rate per Engine (lb/hr)	Modal Emission Rate (pounds per 1,000 pounds fuel flow)					Total Emissions from Annual Engine Run-Ups (tons/year)				
						Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter
Low Power FRS + Fleet 1		5,281		10							11.68	5.73	19.76	0.29	6.13
High Power FRS + Fleet 1		294		28.5							2.14	7.12	48.10	0.16	1.04
Low Power Fleet 2		4,133		10							9.14	4.48	15.46	0.23	4.79
High Power Fleet 2		230		28.5							1.68	5.57	37.65	0.13	0.81
Low Power Change, C/D to E/F		0									2.77	0.43	-0.02	0.02	0.80
High Power Change, C/D to E/F		0									0.31	0.05	-0.00	0.00	0.09
FRS Totals		2,182									5.41	5.03	26.56	0.18	2.80
Phase 1 Fleet Totals		3,394									8.41	7.82	41.31	0.28	4.36
Phase 2 Fleet Increment		4,363									10.82	10.05	53.11	0.36	5.61
NAS Lemoore Phase 1 Totals		5,575									13.82	12.85	67.86	0.45	7.17
NAS Lemoore Phase 2 Totals		5,575									16.90	13.32	67.84	0.48	8.05
NAF El Centro Phase 1 Totals		5,575									13.82	12.85	67.86	0.45	7.17
NAF El Centro Phase 2 Totals		9,938									24.64	22.90	120.97	0.81	12.77

TABLE E-32. ESTIMATED EMISSIONS FROM IN-FRAME ENGINE MAINTENANCE RUN-UPS FOR ADDED F/A-18E/F AIRCRAFT

## Notes:

G Idle = ground idle

IRP = intermediate rated power (equivalent to military power setting)

AB = afterburner

Annual low power in-frame engine run-ups assume 57.4 single engine tests per aircraft per year.

Annual high power in-frame engine run-ups assume 3.2 single engine tests per aircraft per year.

Time in mode estimates and power settings for engine tests provided by Navy personnel.

Aircraft engine emission rates based on data from U.S. Navy (1990; 1997).

PM10 emission rates taken from AESO Report 9725A for F/A-18E/F and from AESO Report 6-90 for F/A-18C/D; the afterburner PM10 rates are extrapolated using curve fit functions derived from PM10 emission factors versus engine thrust values for non-afterburner settings, based on afterburner thrust of 16,500 pounds for F/A-18E/F and 15,254 pounds for F/A-18C/D.

Sulfur oxide emissions are based on 0.02% fuel sulfur content and 100% conversion to sulfur oxides as recommended by AESO Report 6-90.

All values independently rounded for display after calculation.

## Data Sources:

U.S. Navy. 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).

U.S. Navy. 1997. Gaseous and Particulate Emission Indexes for the F414 Turbofan Engine - Draft - Revised. (AESO Memo Report No. 9725A.).

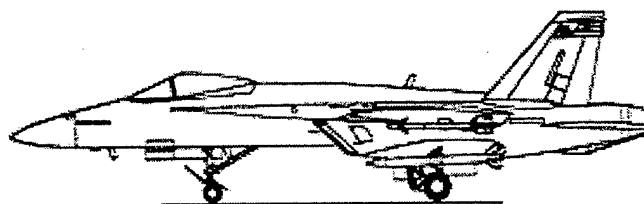
TABLE E-33. PHASING OF F/A-18E/F AIRCRAFT ARRIVALS AND ADDED FLIGHT OPERATIONS

## NAS LEMOORE ALTERNATIVE:

YEAR	F/A-18E/F SQUADRONS IN PLACE	PHASE	F/A-18E/F AIRCRAFT ARRIVALS				ADDED ANNUAL SORTIES	ADDED ANNUAL OPERATIONS
			FRS	FLEET	FRS	FLEET		
			ARRIVAL	ARRIVAL	TOTAL	TOTAL		
2000	PARTIAL FRS + 1 FLEET	PHASE 1	20	14	20	14	5,011	42,364
2001	FULL FRS + 2 FLEET	PHASE 1	16	14	36	28	9,202	77,269
2002	FULL FRS + 3 FLEET	PHASE 1		14	36	42	10,106	82,340
2003	FULL FRS + 4 FLEET	PHASE 1		14	36	56	11,010	87,410
2004	FULL FRS + 4 FLEET	PHASE 1			36	56	11,010	87,410
2005	FULL FRS + 4 ADDED, 1 REPLACED FLEET	PHASE 2		12	36	68	11,010	87,410
2006	FULL FRS + 4 ADDED, 2 REPLACED FLEET	PHASE 2		12	36	80	11,010	87,410
2007	FULL FRS + 4 ADDED, 3 REPLACED FLEET	PHASE 2		12	36	92	11,010	87,410
2008	FULL FRS + 4 ADDED, 4 REPLACED FLEET	PHASE 2		12	36	104	11,010	87,410
2009	FULL FRS + 4 ADDED, 5 REPLACED FLEET	PHASE 2		12	36	116	11,010	87,410
2010	FULL FRS + 4 ADDED, 6 REPLACED FLEET	PHASE 2		12	36	128	11,010	87,410

## NAF EL CENTRO ALTERNATIVE:

YEAR	F/A-18E/F SQUADRONS IN PLACE	PHASE	F/A-18E/F AIRCRAFT ARRIVALS				ADDED ANNUAL SORTIES	ADDED ANNUAL OPERATIONS
			FRS	FLEET	FRS	FLEET		
			ARRIVAL	ARRIVAL	TOTAL	TOTAL		
2000	PARTIAL FRS + 1 FLEET	PHASE 1	20	14	20	14	5,011	42,364
2001	FULL FRS + 2 FLEET	PHASE 1	16	14	36	28	9,202	77,269
2002	FULL FRS + 3 FLEET	PHASE 1		14	36	42	10,106	82,340
2003	FULL FRS + 4 FLEET	PHASE 1		14	36	56	11,010	87,410
2004	FULL FRS + 4 FLEET	PHASE 1			36	56	11,010	87,410
2005	FULL FRS + 5 FLEET	PHASE 2		12	36	68	11,785	91,756
2006	FULL FRS + 6 FLEET	PHASE 2		12	36	80	12,560	96,102
2007	FULL FRS + 7 FLEET	PHASE 2		12	36	92	13,335	100,448
2008	FULL FRS + 8 FLEET	PHASE 2		12	36	104	14,110	104,794
2009	FULL FRS + 9 FLEET	PHASE 2		12	36	116	14,885	109,140
2010	FULL FRS + 10 FLEET	PHASE 2		12	36	128	15,660	113,486



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## ENGINE TEST CELL EMISSIONS ANALYSIS

TABLE E-34. ENGINE TEST CELL EMISSIONS FOR ADDED F/A-18E/F AIRCRAFT, FRS SQUADRON

TEST TYPE	ANNUAL NUMBER OF TESTS	POWER SETTING, % RPM	AVERAGE MINUTES AT POWER SETTING	FUEL FLOW RATE (lb/hr)	FUEL USE PER TEST (lb/test)	ANNUAL EMISSIONS (TONS PER YEAR)				
						ROG	NOx	CO	SOx	PM10
SCHEDULE CHECKS (FRS)	90	FL IDLE	2.0	862	29	0.05	0.00	0.09	0.00	0.02
		83%	2.0	2,801	93	0.00	0.03	0.01	0.00	0.03
		86%	2.0	3,666	122	0.00	0.06	0.01	0.00	0.03
		92%	2.0	6,044	201	0.00	0.16	0.01	0.00	0.04
		95%	2.0	7,628	254	0.00	0.26	0.01	0.00	0.04
		IRP	2.0	10,986	366	0.00	0.58	0.01	0.01	0.03
		MAX AB	2.0	35,603	1,187	0.25	0.51	14.00	0.02	0.02
		Total	14.0		2,253	0.31	1.59	14.13	0.04	0.20
BREAK-IN TESTS (FRS)	81	FL IDLE	40.0	862	575	0.85	0.08	1.68	0.01	0.28
		83%	2.0	2,801	93	0.00	0.03	0.01	0.00	0.03
		86%	6.0	3,666	367	0.00	0.16	0.02	0.01	0.09
		92%	2.0	6,044	201	0.00	0.14	0.01	0.00	0.03
		95%	7.5	7,628	954	0.00	0.87	0.03	0.02	0.12
		IRP	24.0	10,986	4,395	0.02	6.22	0.12	0.07	0.30
		MAX AB	3.0	35,603	1,780	0.34	0.68	18.90	0.03	0.02
		Total	84.5		8,365	1.22	8.18	20.76	0.14	0.88
TOTALS (FRS)	171	FL IDLE				0.90	0.09	1.77	0.01	0.30
		83%				0.00	0.07	0.02	0.00	0.06
		86%				0.00	0.21	0.02	0.01	0.13
		92%				0.00	0.30	0.01	0.01	0.07
		95%				0.01	1.13	0.03	0.02	0.16
		IRP				0.02	6.79	0.13	0.08	0.32
		MAX AB				0.59	1.19	32.90	0.05	0.04
		Total				1.53	9.77	34.89	0.18	1.07

TABLE E-34. ENGINE TEST CELL EMISSIONS FOR ADDED F/A-18E/F AIRCRAFT, FRS SQUADRON

Notes: FL IDLE = flight idle setting (higher rpm than ground idle); used on aircraft carriers  
IRP = intermediate rated power (equivalent to military setting)  
AB = afterburner setting  
ROG = reactive organic compounds  
NOx = nitrogen oxides  
CO = carbon monoxide  
SOx = sulfur oxides  
PM10 = inhalable particulate matter

Times at test settings for break-in tests on F/A-18E/F engines are an unweighted average of test times for F404-GE-400 and F404-GE-402 engines (see Table E-41).

Annual number of engine tests estimated at 4.77 tests per aircraft based on recent fuel use at NAS Lemoore engine test cells (469,567 gallons in 12 months, 4,083 pounds fuel per test, 6.714 pounds per gallon fuel density [from MSDS data for JP-5], 162 F/A-18 aircraft).

Number of tests by test type based on a 10:9 ratio of schedule checks versus break-in tests (Shubert 1997).

Test cell protocols and associated emission rates are presented in Tables E-41 and E-42.

Estimated F/A-18E/F engine fuel flows and thrust values are presented in Table E-43.

Data Sources:

Castro, Tim. 1997. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

Canadian Centre for Occupational Health and Safety. 1997. MSDS Database. CD-ROM.

Shubert, Chris. 1997. 10-31-97 Fax, AIMD Test Cell Statistics. Fax sent by Chris Shubert, NAS Lemoore.

U.S. Navy. 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).

U.S. Navy. 1997a. Comparison of Three Emission Reports on Two Data Sets for the F404-GE-400 and -402 Engines at Naval Air Station, Lemoore, California. AESO Memorandum Report No. 9729.

U.S. Navy. 1997b. Gaseous and Particulate Emission Indexes for the F414 Turbofan Engine - Draft - Revised. (AESO Memo Report No. 9725A.).

TABLE E-35. ENGINE TEST CELL EMISSIONS FOR ADDED F/A-18E/F AIRCRAFT, PHASE 1 FLEET SQUADRONS

TEST TYPE	ANNUAL NUMBER OF TESTS	POWER SETTING, % RPM	AVERAGE MINUTES AT POWER SETTING	FUEL FLOW RATE (lb/hr)	FUEL USE PER TEST (lb/test)	ANNUAL EMISSIONS (TONS PER YEAR)				
						ROG	NOx	CO	SOx	PM10
SCHEDULE CHECKS (FLEET 1)	141	FL IDLE	2.0	862	29	0.07	0.01	0.15	0.00	0.02
		83%	2.0	2,801	93	0.00	0.05	0.02	0.00	0.05
		86%	2.0	3,666	122	0.00	0.09	0.01	0.00	0.05
		92%	2.0	6,044	201	0.00	0.25	0.01	0.01	0.06
		95%	2.0	7,628	254	0.00	0.40	0.01	0.01	0.06
		IRP	2.0	10,986	366	0.00	0.90	0.02	0.01	0.04
		MAX AB	2.0	35,603	1,187	0.39	0.79	21.93	0.03	0.02
		Total	14.0		2,253	0.48	2.50	22.14	0.06	0.31
BREAK-IN TESTS (FLEET 1)	127	FL IDLE	40.0	862	575	1.34	0.13	2.63	0.01	0.44
		83%	2.0	2,801	93	0.00	0.05	0.02	0.00	0.04
		86%	6.0	3,666	367	0.00	0.25	0.03	0.01	0.14
		92%	2.0	6,044	201	0.00	0.22	0.01	0.01	0.05
		95%	7.5	7,628	954	0.01	1.36	0.04	0.02	0.19
		IRP	24.0	10,986	4,395	0.03	9.75	0.19	0.11	0.46
		MAX AB	3.0	35,603	1,780	0.53	1.07	29.63	0.05	0.03
		Total	84.5		8,365	1.92	12.83	32.55	0.21	1.37
TOTALS (FLEET 1)	268	FL IDLE				1.41	0.14	2.78	0.02	0.47
		83%				0.00	0.10	0.03	0.01	0.09
		86%				0.00	0.34	0.03	0.01	0.20
		92%				0.00	0.47	0.02	0.01	0.11
		95%				0.01	1.76	0.05	0.03	0.25
		IRP				0.04	10.65	0.21	0.12	0.51
		MAX AB				0.93	1.86	51.56	0.08	0.06
		Total				2.39	15.32	54.69	0.28	1.68

TABLE E-35. ENGINE TEST CELL EMISSIONS FOR ADDED F/A-18E/F AIRCRAFT, PHASE 1 FLEET SQUADRONS

Notes: FL IDLE = flight idle setting (higher rpm than ground idle); used on aircraft carriers  
IRP = intermediate rated power (equivalent to military setting)  
AB = afterburner setting  
ROG = reactive organic compounds  
NOx = nitrogen oxides  
CO = carbon monoxide  
SOx = sulfur oxides  
PM10 = inhalable particulate matter

Times at test settings for break-in tests on F/A-18E/F engines are an unweighted average of test times for F404-GE-400 and F404-GE-402 engines (see Table E-41).

Annual number of engine tests estimated at 4.77 tests per aircraft based on recent fuel use at NAS Lemoore engine test cells (469,567 gallons in 12 months, 4,083 pounds fuel per test, 6.714 pounds per gallon fuel density [from MSDS data for JP-5], 162 F/A-18 aircraft).

Number of tests by test type based on a 10:9 ratio of schedule checks versus break-in tests (Shubert 1997).

Test cell protocols and associated emission rates are presented in Tables E-41 and E-42.

Estimated F/A-18E/F engine fuel flows and thrust values are presented in Table E-43.

Data Sources:

Castro, Tim. 1997. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

Canadian Centre for Occupational Health and Safety. 1997. MSDS Database. CD-ROM.

Shubert, Chris. 1997. 10-31-97 Fax, AIMD Test Cell Statistics. Fax sent by Chris Shubert, NAS Lemoore.

U.S. Navy. 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).

U.S. Navy. 1997a. Comparison of Three Emission Reports on Two Data Sets for the F404-GE-400 and -402 Engines at Naval Air Station, Lemoore, California. AESO Memorandum Report No. 9729.

U.S. Navy. 1997b. Gaseous and Particulate Emission Indexes for the F414 Turbofan Engine - Draft - Revised. (AESO Memo Report No. 9725A.).

TABLE E-36. ENGINE TEST CELL EMISSIONS FOR ADDED F/A-18E/F AIRCRAFT, PHASE 2 FLEET SQUADRONS

TEST TYPE	ANNUAL NUMBER OF TESTS	POWER SETTING, % RPM	AVERAGE MINUTES AT POWER SETTING	FUEL FLOW RATE (lb/hr)	FUEL USE PER TEST (lb/test)	ANNUAL EMISSIONS (TONS PER YEAR)				
						ROG	NOx	CO	SOx	PM10
SCHEDULE CHECKS (FLEET 2)	181	FL IDLE	2.0	862	29	0.10	0.01	0.19	0.00	0.03
		83%	2.0	2,801	93	0.00	0.07	0.02	0.00	0.06
		86%	2.0	3,666	122	0.00	0.12	0.01	0.00	0.07
		92%	2.0	6,044	201	0.00	0.32	0.01	0.01	0.08
		95%	2.0	7,628	254	0.00	0.52	0.02	0.01	0.07
		IRP	2.0	10,986	366	0.00	1.16	0.02	0.01	0.06
		MAX AB	2.0	35,603	1,187	0.51	1.02	28.15	0.04	0.03
		Total	14.0		2,253	0.61	3.20	28.43	0.08	0.40
BREAK-IN TESTS (FLEET 2)	163	FL IDLE	40.0	862	575	1.72	0.17	3.38	0.02	0.57
		83%	2.0	2,801	93	0.00	0.06	0.02	0.00	0.06
		86%	6.0	3,666	367	0.00	0.31	0.03	0.01	0.18
		92%	2.0	6,044	201	0.00	0.29	0.01	0.01	0.07
		95%	7.5	7,628	954	0.01	1.75	0.05	0.03	0.25
		IRP	24.0	10,986	4,395	0.04	12.51	0.25	0.14	0.59
		MAX AB	3.0	35,603	1,780	0.68	1.37	38.03	0.06	0.04
		Total	84.5		8,365	2.46	16.46	41.78	0.27	1.76
TOTALS (FLEET 2)	344	FL IDLE				1.81	0.18	3.57	0.02	0.60
		83%				0.00	0.13	0.04	0.01	0.12
		86%				0.00	0.43	0.04	0.02	0.25
		92%				0.00	0.60	0.02	0.01	0.14
		95%				0.01	2.26	0.07	0.04	0.32
		IRP				0.05	13.67	0.27	0.16	0.65
		MAX AB				1.19	2.39	66.18	0.10	0.07
		Total				3.07	19.67	70.20	0.35	2.16

TABLE E-36. ENGINE TEST CELL EMISSIONS FOR ADDED F/A-18E/F AIRCRAFT, PHASE 2 FLEET SQUADRONS

Notes: FL IDLE = flight idle setting (higher rpm than ground idle); used on aircraft carriers  
 IRP = intermediate rated power (equivalent to military setting)  
 AB = afterburner setting  
 ROG = reactive organic compounds  
 NOx = nitrogen oxides  
 CO = carbon monoxide  
 SOx = sulfur oxides  
 PM10 = inhalable particulate matter

Times at test settings for break-in tests on F/A-18E/F engines are an unweighted average of test times for F404-GE-400 and F404-GE-402 engines (see Table E-41).

Annual number of engine tests estimated at 4.77 tests per aircraft based on recent fuel use at NAS Lemoore engine test cells (469,567 gallons in 12 months, 4,083 pounds fuel per test, 6.714 pounds per gallon fuel density [from MSDS data for JP-5], 162 F/A-18 aircraft).

Number of tests by test type based on a 10:9 ratio of schedule checks versus break-in tests (Shubert 1997).

Test cell protocols and associated emission rates are presented in Tables E-41 and E-42.

Estimated F/A-18E/F engine fuel flows and thrust values are presented in Table E-43.

#### Data Sources:

Castro, Tim. 1997. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

Canadian Centre for Occupational Health and Safety. 1997. MSDS Database. CD-ROM.

Shubert, Chris. 1997. 10-31-97 Fax, AIMD Test Cell Statistics. Fax sent by Chris Shubert, NAS Lemoore.

U.S. Navy. 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).

U.S. Navy. 1997a. Comparison of Three Emission Reports on Two Data Sets for the F404-GE-400 and -402 Engines at Naval Air Station, Lemoore, California. AESO Memorandum Report No. 9729.

U.S. Navy. 1997b. Gaseous and Particulate Emission Indexes for the F414 Turbofan Engine - Draft - Revised. (AESO Memo Report No. 9725A.).

TABLE E-37. ENGINE TEST CELL EMISSIONS FOR REPLACED F/A-18C/D AIRCRAFT SQUADRONS

TEST TYPE	ANNUAL NUMBER OF TESTS	POWER SETTING, % RPM	AVERAGE MINUTES AT POWER SETTING	FUEL FLOW RATE (lb/hr)	FUEL USE PER TEST (lb/test)	ANNUAL EMISSIONS (TONS PER YEAR)				
						ROG	NOx	CO	SOx	PM10
SCHEDULE	181	FL IDLE	2.0	815	27	0.11	0.00	0.30	0.00	0.03
CHECKS		83%	2.0	2,423	81	0.00	0.04	0.04	0.00	0.06
(REPLACED		86%	2.0	3,108	104	0.00	0.06	0.04	0.00	0.06
C/D FLEET)		92%	2.0	5,587	186	0.01	0.20	0.02	0.01	0.08
		95%	2.0	6,541	218	0.01	0.29	0.02	0.01	0.08
		IRP	2.0	8,587	286	0.01	0.65	0.03	0.01	0.07
		MAX AB	2.0	28,397	947	0.01	0.79	1.98	0.03	0.04
		Total	14.0		1,849	0.15	2.03	2.43	0.07	0.42
BREAK-IN	163	FL IDLE	36.4	815	494	1.79	0.06	4.98	0.02	0.47
TESTS		83%	2.0	2,423	81	0.00	0.03	0.04	0.00	0.05
(REPLACED		86%	4.4	3,108	228	0.01	0.12	0.08	0.01	0.13
C/D FLEET)		92%	2.0	5,587	186	0.01	0.18	0.02	0.01	0.07
		95%	6.1	6,541	665	0.02	0.80	0.06	0.02	0.22
		IRP	24.4	8,587	3,492	0.09	7.16	0.30	0.11	0.80
		MAX AB	3.0	28,397	1,420	0.02	1.07	2.68	0.05	0.06
		Total	78.3		6,566	1.93	9.42	8.15	0.21	1.79
TOTALS	344	FL IDLE				1.90	0.07	5.28	0.02	0.50
(REPLACED		83%				0.01	0.07	0.08	0.01	0.11
C/D FLEET)		86%				0.01	0.18	0.12	0.01	0.19
		92%				0.01	0.38	0.04	0.01	0.15
		95%				0.03	1.09	0.08	0.03	0.29
		IRP				0.10	7.81	0.33	0.12	0.87
		MAX AB				0.03	1.86	4.66	0.08	0.10
		Total				2.09	11.46	10.58	0.28	2.21

TABLE E-37. ENGINE TEST CELL EMISSIONS FOR REPLACED F/A-18C/D AIRCRAFT SQUADRONS

Notes: FL IDLE = flight idle setting (higher rpm than ground idle); used on aircraft carriers  
IRP = intermediate rated power (equivalent to military setting)  
AB = afterburner setting  
ROG = reactive organic compounds  
NOx = nitrogen oxides  
CO = carbon monoxide  
SOx = sulfur oxides  
PM10 = inhalable particulate matter

Times at test settings for break-in tests on F/A-18C/D engines are a weighted average of test times for F404-GE-400 engines (70%) and F404-GE-402 engines (30%) based on data in Shubert (1997). Annual number of engine tests estimated at 4.77 tests per aircraft based on recent fuel use at NAS Lemoore engine test cells (469,567 gallons in 12 months, 4,083 pounds fuel per test, 6.714 pounds per gallon fuel density [from MSDS data for JP-5], 162 F/A-18 aircraft).

Number of tests by test type based on a 10:9 ratio of schedule checks versus break-in tests (Shubert 1997).

Test cell protocols and associated emission rates are presented in Table E-41.

Data Sources:

Castro, Tim. 1997. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

Canadian Centre for Occupational Health and Safety. 1997. MSDS Database. CD-ROM.

Shubert, Chris. 1997. 10-31-97 Fax, AIMD Test Cell Statistics. Fax sent by Chris Shubert, NAS Lemoore.

U.S. Navy. 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).

U.S. Navy. 1997a. Comparison of Three Emission Reports on Two Data Sets for the F404-GE-400 and -402 Engines at Naval Air Station, Lemoore, California. AESO Memorandum Report No. 9729.

TABLE E-38. ENGINE TEST CELL EMISSIONS FOR ADDED F/A-18E/F AIRCRAFT, PHASE 1 TOTALS

TEST TYPE	ANNUAL NUMBER OF TESTS	POWER SETTING, % RPM	AVERAGE MINUTES AT POWER SETTING	FUEL FLOW RATE (lb/hr)	FUEL USE PER TEST (lb/test)	ANNUAL EMISSIONS (TONS PER YEAR)				
						ROG	NOx	CO	SOx	PM10
SCHEDULE	231	FL IDLE	2.0	862	29	0.12	0.01	0.24	0.00	0.04
CHECKS		83%	2.0	2,801	93	0.00	0.09	0.03	0.00	0.08
(PHASE 1		86%	2.0	3,666	122	0.00	0.15	0.02	0.01	0.09
TOTALS)		92%	2.0	6,044	201	0.00	0.40	0.02	0.01	0.10
		95%	2.0	7,628	254	0.00	0.66	0.02	0.01	0.09
		IRP	2.0	10,986	366	0.01	1.48	0.03	0.02	0.07
		MAX AB	2.0	35,603	1,187	0.65	1.30	35.93	0.05	0.04
		Total	14.0		2,253	0.78	4.09	36.28	0.10	0.51
BREAK-IN	208	FL IDLE	40.0	862	575	2.19	0.21	4.31	0.02	0.73
TESTS		83%	2.0	2,801	93	0.00	0.08	0.03	0.00	0.07
(PHASE 1		86%	6.0	3,666	367	0.00	0.40	0.04	0.02	0.24
TOTALS)		92%	2.0	6,044	201	0.00	0.36	0.01	0.01	0.09
		95%	7.5	7,628	954	0.01	2.23	0.07	0.04	0.31
		IRP	24.0	10,986	4,395	0.05	15.97	0.32	0.18	0.76
		MAX AB	3.0	35,603	1,780	0.87	1.75	48.53	0.07	0.05
		Total	84.5		8,365	3.14	21.01	53.31	0.35	2.25
TOTALS	439	FL IDLE				2.31	0.22	4.55	0.03	0.77
(PHASE 1		83%				0.00	0.17	0.05	0.01	0.15
TOTALS)		86%				0.01	0.55	0.06	0.02	0.32
		92%				0.01	0.77	0.03	0.02	0.18
		95%				0.02	2.89	0.09	0.05	0.41
		IRP				0.06	17.45	0.34	0.20	0.83
		MAX AB				1.52	3.05	84.46	0.13	0.09
		Total				3.92	25.10	89.59	0.45	2.75

TABLE E-38. ENGINE TEST CELL EMISSIONS FOR ADDED F/A-18E/F AIRCRAFT, PHASE 1 TOTALS

Notes: FL IDLE = flight idle setting (higher rpm than ground idle); used on aircraft carriers  
IRP = intermediate rated power (equivalent to military setting)  
AB = afterburner setting  
ROG = reactive organic compounds  
NOx = nitrogen oxides  
CO = carbon monoxide  
SOx = sulfur oxides  
PM10 = inhalable particulate matter

Times at test settings for break-in tests on F/A-18E/F engines are an unweighted average of test times for F404-GE-400 and F404-GE-402 engines (see Table E-41).

Annual number of engine tests estimated at 4.77 tests per aircraft based on recent fuel use at NAS Lemoore engine test cells (469,567 gallons in 12 months, 4,083 pounds fuel per test, 6.714 pounds per gallon fuel density [from MSDS data for JP-5], 162 F/A-18 aircraft).

Number of tests by test type based on a 10:9 ratio of schedule checks versus break-in tests (Shubert 1997).

Test cell protocols and associated emission rates are presented in Tables E-41 and E-42.

Estimated F/A-18E/F engine fuel flows and thrust values are presented in Table E-43.

Data Sources:

Castro, Tim. 1997. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

Canadian Centre for Occupational Health and Safety. 1997. MSDS Database. CD-ROM.

Shubert, Chris. 1997. 10-31-97 Fax, AIMD Test Cell Statistics. Fax sent by Chris Shubert, NAS Lemoore.

U.S. Navy. 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).

U.S. Navy. 1997a. Comparison of Three Emission Reports on Two Data Sets for the F404-GE-400 and -402 Engines at Naval Air Station, Lemoore, California. AESO Memorandum Report No. 9729.

U.S. Navy. 1997b. Gaseous and Particulate Emission Indexes for the F414 Turbofan Engine - Draft - Revised. (AESO Memo Report No. 9725A.).

TABLE E-39. ENGINE TEST CELL EMISSIONS FOR ADDED F/A-18E/F AIRCRAFT, NAS LEMOORE PHASE 2 TOTALS

TEST TYPE	ANNUAL NUMBER OF TESTS	POWER SETTING, % RPM	AVERAGE MINUTES AT POWER SETTING	FUEL FLOW RATE (lb/hr)	FUEL USE PER TEST (lb/test)	ANNUAL EMISSIONS (TONS PER YEAR)				
						ROG	NOx	CO	SOx	PM10
SCHEDULE	231	FL IDLE	2.0	862	29	0.11	0.02	0.12	0.00	0.04
CHECKS		83%	2.0	2,801	93	-0.00	0.12	0.01	0.00	0.08
(PHASE 2		86%	2.0	3,666	122	-0.00	0.20	-0.01	0.01	0.09
TOTALS,		92%	2.0	6,044	201	-0.00	0.52	0.01	0.01	0.09
NAS		95%	2.0	7,628	254	-0.00	0.89	0.01	0.01	0.09
LEMOORE)		IRP	2.0	10,986	366	0.00	1.98	0.02	0.02	0.05
		MAX AB	2.0	35,603	1,187	1.14	1.53	62.10	0.06	0.03
		Total	14.0		2,253	1.25	5.26	62.27	0.12	0.48
BREAK-IN	208	FL IDLE	40.0	862	575	2.11	0.32	2.72	0.03	0.83
TESTS		83%	2.0	2,801	93	-0.00	0.11	0.01	0.00	0.08
(PHASE 2		86%	6.0	3,666	367	-0.00	0.60	-0.01	0.02	0.29
TOTALS,		92%	2.0	6,044	201	-0.00	0.47	0.01	0.01	0.08
NAS		95%	7.5	7,628	954	0.00	3.17	0.06	0.05	0.34
LEMOORE)		IRP	24.0	10,986	4,395	0.01	21.32	0.26	0.21	0.55
		MAX AB	3.0	35,603	1,780	1.54	2.06	83.88	0.09	0.04
		Total	84.5		8,365	3.67	28.05	86.94	0.41	2.22
TOTALS	439	FL IDLE				2.22	0.33	2.84	0.03	0.87
(PHASE 2		83%				-0.00	0.23	0.02	0.01	0.16
TOTALS,		86%				-0.00	0.80	-0.02	0.03	0.39
NAS		92%				-0.00	0.99	0.02	0.02	0.17
LEMOORE)		95%				0.00	4.06	0.08	0.06	0.43
		IRP				0.01	23.31	0.29	0.23	0.61
		MAX AB				2.69	3.59	145.98	0.15	0.07
		Total				4.91	33.31	149.21	0.53	2.70

TABLE E-39. ENGINE TEST CELL EMISSIONS FOR ADDED F/A-18E/F AIRCRAFT, NAS LEMOORE PHASE 2 TOTALS

Notes: FL IDLE = flight idle setting (higher rpm than ground idle); used on aircraft carriers  
 IRP = intermediate rated power (equivalent to military setting)  
 AB = afterburner setting  
 ROG = reactive organic compounds  
 NOx = nitrogen oxides  
 CO = carbon monoxide  
 SOx = sulfur oxides  
 PM10 = inhalable particulate matter

Times at test settings for break-in tests on F/A-18E/F engines are an unweighted average of test times for F404-GE-400 and F404-GE-402 engines (see Table E-41).

Annual number of engine tests estimated at 4.77 tests per aircraft based on recent fuel use at NAS Lemoore engine test cells (469,567 gallons in 12 months, 4,083 pounds fuel per test, 6.714 pounds per gallon fuel density [from MSDS data for JP-5], 162 F/A-18 aircraft).

Number of tests by test type based on a 10:9 ratio of schedule checks versus break-in tests (Shubert 1997).

Test cell protocols and associated emission rates are presented in Tables E-41 and E-42.

Estimated F/A-18E/F engine fuel flows and thrust values are presented in Table E-43.

#### Data Sources:

Castro, Tim. 1997. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

Canadian Centre for Occupational Health and Safety. 1997. MSDS Database. CD-ROM.

Shubert, Chris. 1997. 10-31-97 Fax, AIMD Test Cell Statistics. Fax sent by Chris Shubert, NAS Lemoore.

U.S. Navy. 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).

U.S. Navy. 1997a. Comparison of Three Emission Reports on Two Data Sets for the F404-GE-400 and -402 Engines at Naval Air Station, Lemoore, California. AESO Memorandum Report No. 9729.

U.S. Navy. 1997b. Gaseous and Particulate Emission Indexes for the F414 Turbofan Engine - Draft - Revised. (AESO Memo Report No. 9725A.).

TABLE E-40. ENGINE TEST CELL EMISSIONS FOR ADDED F/A-18E/F AIRCRAFT, NAF EL CENTRO PHASE 2 TOTALS

TEST TYPE	ANNUAL NUMBER OF TESTS	POWER SETTING, % RPM	AVERAGE MINUTES AT POWER SETTING	FUEL FLOW RATE (lb/hr)	FUEL USE PER TEST (lb/test)	ANNUAL EMISSIONS (TONS PER YEAR)				
						ROG	NOx	CO	SOx	PM10
SCHEDULE	412	FL IDLE	2.0	862	29	0.22	0.02	0.43	0.00	0.07
CHECKS		83%	2.0	2,801	93	0.00	0.16	0.05	0.01	0.14
(PHASE 2		86%	2.0	3,666	122	0.00	0.27	0.03	0.01	0.16
TOTALS,		92%	2.0	6,044	201	0.00	0.72	0.03	0.02	0.17
NAF		95%	2.0	7,628	254	0.01	1.18	0.04	0.02	0.17
EL CENTRO)		IRP	2.0	10,986	366	0.01	2.64	0.05	0.03	0.13
		MAX AB	2.0	35,603	1,187	1.15	2.32	64.08	0.10	0.07
		Total	14.0		2,253	1.40	7.29	64.71	0.19	0.90
BREAK-IN	371	FL IDLE	40.0	862	575	3.91	0.38	7.70	0.04	1.30
TESTS		83%	2.0	2,801	93	0.00	0.14	0.05	0.01	0.13
(PHASE 2		86%	6.0	3,666	367	0.01	0.72	0.07	0.03	0.42
TOTALS,		92%	2.0	6,044	201	0.00	0.65	0.03	0.01	0.15
NAF		95%	7.5	7,628	954	0.02	3.98	0.12	0.07	0.56
EL CENTRO)		IRP	24.0	10,986	4,395	0.10	28.48	0.56	0.33	1.35
		MAX AB	3.0	35,603	1,780	1.56	3.13	86.56	0.13	0.10
		Total	84.5		8,365	5.60	37.47	95.08	0.62	4.01
TOTALS	783	FL IDLE				4.12	0.40	8.12	0.05	1.37
(PHASE 2		83%				0.01	0.30	0.10	0.01	0.27
TOTALS,		86%				0.01	0.98	0.10	0.04	0.58
NAF		92%				0.01	1.37	0.06	0.03	0.32
EL CENTRO)		95%				0.03	5.15	0.16	0.09	0.72
		IRP				0.11	31.12	0.61	0.36	1.48
		MAX AB				2.71	5.44	150.64	0.23	0.17
		Total				7.00	44.77	159.79	0.81	4.91

TABLE E-40. ENGINE TEST CELL EMISSIONS FOR ADDED F/A-18E/F AIRCRAFT, NAF EL CENTRO PHASE 2 TOTALS

Notes: FL IDLE = flight idle setting (higher rpm than ground idle); used on aircraft carriers  
IRP = intermediate rated power (equivalent to military setting)  
AB = afterburner setting  
ROG = reactive organic compounds  
NOx = nitrogen oxides  
CO = carbon monoxide  
SOx = sulfur oxides  
PM10 = inhalable particulate matter

Times at test settings for break-in tests on F/A-18E/F engines are an unweighted average of test times for F404-GE-400 and F404-GE-402 engines (see Table E-41).

Annual number of engine tests estimated at 4.77 tests per aircraft based on recent fuel use at NAS Lemoore engine test cells (469,567 gallons in 12 months, 4,083 pounds fuel per test, 6.714 pounds per gallon fuel density [from MSDS data for JP-5], 162 F/A-18 aircraft).

Number of tests by test type based on a 10:9 ratio of schedule checks versus break-in tests (Shubert 1997).

Test cell protocols and associated emission rates are presented in Tables E-41 and E-42.

Estimated F/A-18E/F engine fuel flows and thrust values are presented in Table E-43.

Data Sources:

Castro, Tim. 1997. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

Canadian Centre for Occupational Health and Safety. 1997. MSDS Database. CD-ROM.

Shubert, Chris. 1997. 10-31-97 Fax, AIMD Test Cell Statistics. Fax sent by Chris Shubert, NAS Lemoore.

U.S. Navy. 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).

U.S. Navy. 1997a. Comparison of Three Emission Reports on Two Data Sets for the F404-GE-400 and -402 Engines at Naval Air Station, Lemoore, California. AESO Memorandum Report No. 9729.

U.S. Navy. 1997b. Gaseous and Particulate Emission Indexes for the F414 Turbofan Engine - Draft - Revised. (AESO Memo Report No. 9725A.).

TABLE E-41. ENGINE TEST CELL OPERATING PROTOCOLS FOR F/A-18C/D ENGINES

TEST TYPE	TEST		TOTAL MINUTES	AESO		AESO REPORT 6-90							
	PROTOCOL			REPORT		-----							
	ENGINE	POWER		# 9729	CLOSEST	THRUST	FUEL	FUEL	EMISSION RATE (POUNDS/1,000 POUNDS FUEL)				
	RPM	SETTING, AT POWER		% THRUST	THRUST	RATING	FLOW	USE	-----				
SETTING	% RPM	SETTING	SETTING	SETTING	(pounds)	(lb/hr)	(lb/test)	ROG	NOx	CO	SOx	PM10	
SCHEDULE	FL IDLE	FL IDLE	2	FL IDLE	FL IDLE	234	815	27	44.50	1.53	123.52	0.40	11.60
CHECKS	13,500	83%	2	24%	26%	2,782	2,423	81	0.66	5.15	5.77	0.40	7.76
(BOTH	14,000	86%	2	34%	37%	3,845	3,108	104	0.48	6.42	4.31	0.40	6.81
ENGINE	15,000	92%	2	58%	63%	6,662	5,587	186	0.38	11.78	1.16	0.40	4.80
MODELS)	15,500	95%	2	76%	76%	8,031	6,541	218	0.35	14.80	1.09	0.40	3.97
	IRP	100%	2	100%	IRP	10,548	8,587	286	0.31	25.16	1.05	0.40	2.81
	MAX AB	MAX AB	2	MAX AB	MAX AB	15,254	28,397	947	0.13	9.22	23.12	0.40	0.50
	-----		-----			-----							
	Total		14				7,922	1,849					
BREAK-IN	FL IDLE	FL IDLE	31	FL IDLE	FL IDLE	234	815	421	44.50	1.53	123.52	0.40	11.60
TEST,	13,500	83%	2	24%	26%	2,782	2,423	81	0.66	5.15	5.77	0.40	7.76
F404-	14,000	86%	2	34%	37%	3,845	3,108	104	0.48	6.42	4.31	0.40	6.81
GE-400	15,000	92%	2	58%	63%	6,662	5,587	186	0.38	11.78	1.16	0.40	4.80
ENGINE	15,500	95%	4	76%	76%	8,031	6,541	436	0.35	14.80	1.09	0.40	3.97
	IRP	100%	25	100%	IRP	10,548	8,587	3,578	0.31	25.16	1.05	0.40	2.81
	MAX AB	MAX AB	3	MAX AB	MAX AB	15,254	28,397	1,420	0.13	9.22	23.12	0.40	0.50
	-----		-----			-----							
	Total		69				5,413	6,225					
BREAK-IN	FL IDLE	FL IDLE	49	FL IDLE	FL IDLE	234	815	665	44.50	1.53	123.52	0.40	11.60
TEST,	13,500	83%	2	24%	26%	2,782	2,423	81	0.66	5.15	5.77	0.40	7.76
F404-	14,000	86%	10	34%	37%	3,845	3,108	518	0.48	6.42	4.31	0.40	6.81
GE-402	15,000	92%	2	58%	63%	6,662	5,587	186	0.38	11.78	1.16	0.40	4.80
ENGINE	15,500	95%	11	76%	76%	8,031	6,541	1,199	0.35	14.80	1.09	0.40	3.97
	IRP	100%	23	100%	IRP	10,548	8,587	3,292	0.31	25.16	1.05	0.40	2.81
	MAX AB	MAX AB	3	MAX AB	MAX AB	15,254	28,397	1,420	0.13	9.22	23.12	0.40	0.50
	-----		-----			-----							
	Total		100				4,417	7,361					
WEIGHTED	FL IDLE	FL IDLE	18.3	FL IDLE	FL IDLE	234	815	248	44.50	1.53	123.52	0.40	11.60
AVERAGE	13,500	83%	2.0	24%	26%	2,782	2,423	81	0.66	5.15	5.77	0.40	7.76
TEST	14,000	86%	3.1	34%	37%	3,845	3,108	163	0.48	6.42	4.31	0.40	6.81
	15,000	92%	2.0	58%	63%	6,662	5,587	186	0.38	11.78	1.16	0.40	4.80
	15,500	95%	3.9	76%	76%	8,031	6,541	430	0.35	14.80	1.09	0.40	3.97
	IRP	100%	12.6	100%	IRP	10,548	8,587	1,805	0.31	25.16	1.05	0.40	2.81
	MAX AB	MAX AB	2.5	MAX AB	MAX AB	15,254	28,397	1,171	0.13	9.22	23.12	0.40	0.50
	-----		-----			-----							
	Total		44.5				5,511	4,083					

TABLE E-41. ENGINE TEST CELL OPERATING PROTOCOLS FOR F/A-18C/D ENGINES

Notes: FL IDLE = flight idle setting (higher rpm than ground idle); used on aircraft carriers  
 IRP = intermediate rated power (equivalent to military setting)  
 AB = afterburner setting  
 ROG = reactive organic compounds  
 NO<sub>x</sub> = nitrogen oxides  
 CO = carbon monoxide  
 SO<sub>x</sub> = sulfur oxides  
 PM<sub>10</sub> = inhalable particulate matter

Engine test cell protocols for existing F/A-18 aircraft engines provided by Shubert (1997).

AESO Report 9729 used to identify engine thrust ratings for test protocol rpm settings.

Test cell fuel use and associated emission rates are from AESO Report 6-90, based on closest match to test cell thrust ratings.

NO<sub>x</sub> emission rate for the flight idle setting extrapolated from AESO Report 6-90 data using a complex curve fit equation derived from data for non-afterburner power settings.

PM<sub>10</sub> emission rates for power settings other than IRP extrapolated from AESO Report 6-90 data using a square-root function curve fit applied to data for ground idle (78 pounds thrust), 86% rpm (4,364 pounds thrust), and IRP (10,548 pounds thrust) settings.

PM<sub>10</sub> emission rate for IRP setting taken directly from AESO Report 6-90.

Sulfur oxide emission rates based on recommendations in AESO Report 6-90.

Weighted average test cell use (from NAS Lemoore AIMD staff): 10:9 ratio of schedule checks vs break-in tests; 70% -400 engines, 30% -402 engines.

#### Data Sources:

Shubert, Chris. 1997. 10-31-97 Fax, AIMD Test Cell Statistics. Fax sent by Chris Shubert, NAS Lemoore.

U.S. Navy. 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).

U.S. Navy. 1997a. Comparison of Three Emission Reports on Two Data Sets for the F404-GE-400 and -402 Engines at Naval Air Station, Lemoore, California. AESO Memorandum Report No. 9729.

U.S. Navy. 1997b. Gaseous and Particulate Emission Indexes for the F414 Turbofan Engine - Draft - Revised. (AESO Memo Report No. 9725A.).

TABLE E-42. EXTRAPOLATED ENGINE TEST CELL OPERATING PROTOCOLS FOR F/A-18E/F ENGINES

TEST TYPE	TEST PROTOCOL	ESTIMATED THRUST	TOTAL MINUTES	FUEL FLOW RATE	FUEL USE	EMISSION RATE (POUNDS/1,000 POUNDS FUEL)				
	POWER SETTING, % RPM	RATING, POUNDS	AT POWER SETTING	(lb/hr)	(lb/test)	ROG	NOx	CO	SOx	PM10
SCHEDULE CHECKS	FL IDLE	582	2.0	862	29	36.63	3.55	72.17	0.40	12.17
	83%	3,498	2.0	2,801	93	0.16	8.26	2.66	0.40	7.30
	86%	4,638	2.0	3,666	122	0.12	10.53	1.09	0.40	6.19
	92%	7,560	2.0	6,044	201	0.12	17.38	0.70	0.40	4.12
	95%	9,399	2.0	7,628	254	0.12	22.48	0.69	0.40	3.16
	IRP	13,112	2.0	10,986	366	0.12	34.94	0.69	0.40	1.66
	MAX AB	16,500	2.0	35,603	1,187	4.72	9.47	262.12	0.40	0.29
	Total		14.0	9,656	2,253					
BREAK-IN TEST	FL IDLE	582	40.0	862	575	36.63	3.55	72.17	0.40	12.17
	83%	3,498	2.0	2,801	93	0.16	8.26	2.66	0.40	7.30
	86%	4,638	6.0	3,666	367	0.12	10.53	1.09	0.40	6.19
	92%	7,560	2.0	6,044	201	0.12	17.38	0.70	0.40	4.12
	95%	9,399	7.5	7,628	954	0.12	22.48	0.69	0.40	3.16
	IRP	13,112	24.0	10,986	4,395	0.12	34.94	0.69	0.40	1.66
	MAX AB	16,500	3.0	35,603	1,780	4.72	9.47	262.12	0.40	0.29
	Total		84.5	5,939	8,365					
WEIGHTED AVERAGE TEST	FL IDLE	582	20.0	862	287	36.63	3.55	72.17	0.40	12.17
	83%	3,498	2.0	2,801	93	0.16	8.26	2.66	0.40	7.30
	86%	4,638	3.9	3,666	238	0.12	10.53	1.09	0.40	6.19
	92%	7,560	2.0	6,044	201	0.12	17.38	0.70	0.40	4.12
	95%	9,399	4.6	7,628	585	0.12	22.48	0.69	0.40	3.16
	IRP	13,112	12.4	10,986	2,274	0.12	34.94	0.69	0.40	1.66
	MAX AB	16,500	2.5	35,603	1,468	4.72	9.47	262.12	0.40	0.29
	Total		47.4	6,517	5,148					

TABLE E-42. EXTRAPOLATED ENGINE TEST CELL OPERATING PROTOCOLS FOR F/A-18E/F ENGINES

Notes: FL IDLE = flight idle setting (higher rpm than ground idle); used on aircraft carriers  
IRP = intermediate rated power (equivalent to military setting)  
AB = afterburner setting  
ROG = reactive organic compounds  
NOx = nitrogen oxides  
CO = carbon monoxide  
SOx = sulfur oxides  
PM10 = inhalable particulate matter

Times at test settings for break-in tests are an unweighted average of test times for F404-GE-400 and F404-GE-402 engines.

Emission rates taken from AESO Report 9725A, except for afterburner PM10 rate.

Sulfur oxide emission rates based on recommendations in AESO Report 6-90.

PM10 emission rate for maximum afterburner setting extrapolated using a curve fit function derived from PM10 emission factors versus engine thrust for non-afterburner settings; afterburner thrust assumed to be 16,500 pounds.

Engine thrust for non-afterburner settings derived by back-solving the fuel flow versus thrust equation presented in AESO Report 9725A.

Weighted average test times based on a 10:9 ratio of schedule checks versus break-in tests (per NAS Lemoore AIMD staff).

Data Sources:

Shubert, Chris. 1997. 10-31-97 Fax, AIMD Test Cell Statistics. Fax sent by Chris Shubert, NAS Lemoore.

U.S. Navy. 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).

U.S. Navy. 1997a. Comparison of Three Emission Reports on Two Data Sets for the F404-GE-400 and -402 Engines at Naval Air Station, Lemoore, California. AESO Memorandum Report No. 9729.

TABLE E-43. ESTIMATED THRUST AND FUEL FLOWS FOR F/A-18E/F AIRCRAFT

POWER SETTING, % RPM	FUEL FLOW, LB/HR	ESTIMATED THRUST, POUNDS	POWER SETTING, % THRUST
G IDLE	749.1	366	G IDLE
F IDLE	862.3	582	F IDLE
72%	911.2	671	5.1%
73%	1,019.4	861	6.6%
74%	1,137.9	1,061	8.1%
75%	1,267.5	1,272	9.7%
76%	1,408.8	1,496	11.4%
77%	1,582.8	1,765	13.5%
78%	1,730.2	1,986	15.1%
79%	1,912.0	2,254	17.2%
80%	2,108.9	2,538	19.4%
81%	2,322.1	2,840	21.7%
82%	2,552.4	3,159	24.1%
83%	2,800.9	3,498	26.7%
84%	3,068.7	3,857	29.4%
85%	3,356.8	4,236	32.3%
86%	3,666.4	4,638	35.4%
87%	3,998.6	5,062	38.6%
88%	4,354.7	5,510	42.0%
89%	4,736.0	5,983	45.6%
90%	5,143.6	6,482	49.4%
91%	5,579.0	7,007	53.4%
92%	6,043.5	7,560	57.7%
93%	6,538.5	8,142	62.1%
94%	7,085.6	8,777	66.9%
95%	7,628.1	9,399	71.7%
96%	8,221.7	10,071	76.8%
97%	8,853.8	10,779	82.2%
98%	9,524.2	11,521	87.9%
99%	10,234.4	12,298	93.8%
IRP	10,986.3	13,112	100.0%
MIN AB	12,012.2	14,208	MIN AB
MAX AB	35,603.3	16,500	MAX AB

TABLE E-43. ESTIMATED THRUST AND FUEL FLOWS FOR F/A-18E/F AIRCRAFT

Notes: G IDLE = ground idle  
F IDLE = flight idle  
IRP = intermediate rated power (equivalent to military)  
AB = afterburner setting  
Fuel flow data for the F414-GE-400 engine from AESO Report 9725A.  
Engine thrust estimates back-calculated from equation for fuel flow vs engine thrust given in AESO Report 9725A, assuming a thrust of 16,500 pounds for the maximum afterburner setting (compared to 15,254 pounds with the F404-GE-400 engine):

Data Sources:

U.S. Navy. 1997a. Comparison of Three Emission Reports on Two Data Sets for the F404-GE-400 and -402 Engines at Naval Air Station, Lemoore, California. AESO Memorandum Report No. 9729.  
U.S. Navy. 1997b. Gaseous and Particulate Emission Indexes for the F414 Turbofan Engine - Draft - Revised. (AESO Memo Report No. 9725A.).

AESO 9725A regression equation (idle through IRP settings):  
$$\text{FUEL FLOW} = 592.48 + 0.1549 * (\text{THRUST}^{1.1722})$$

Back-solving for thrust vs fuel flow:

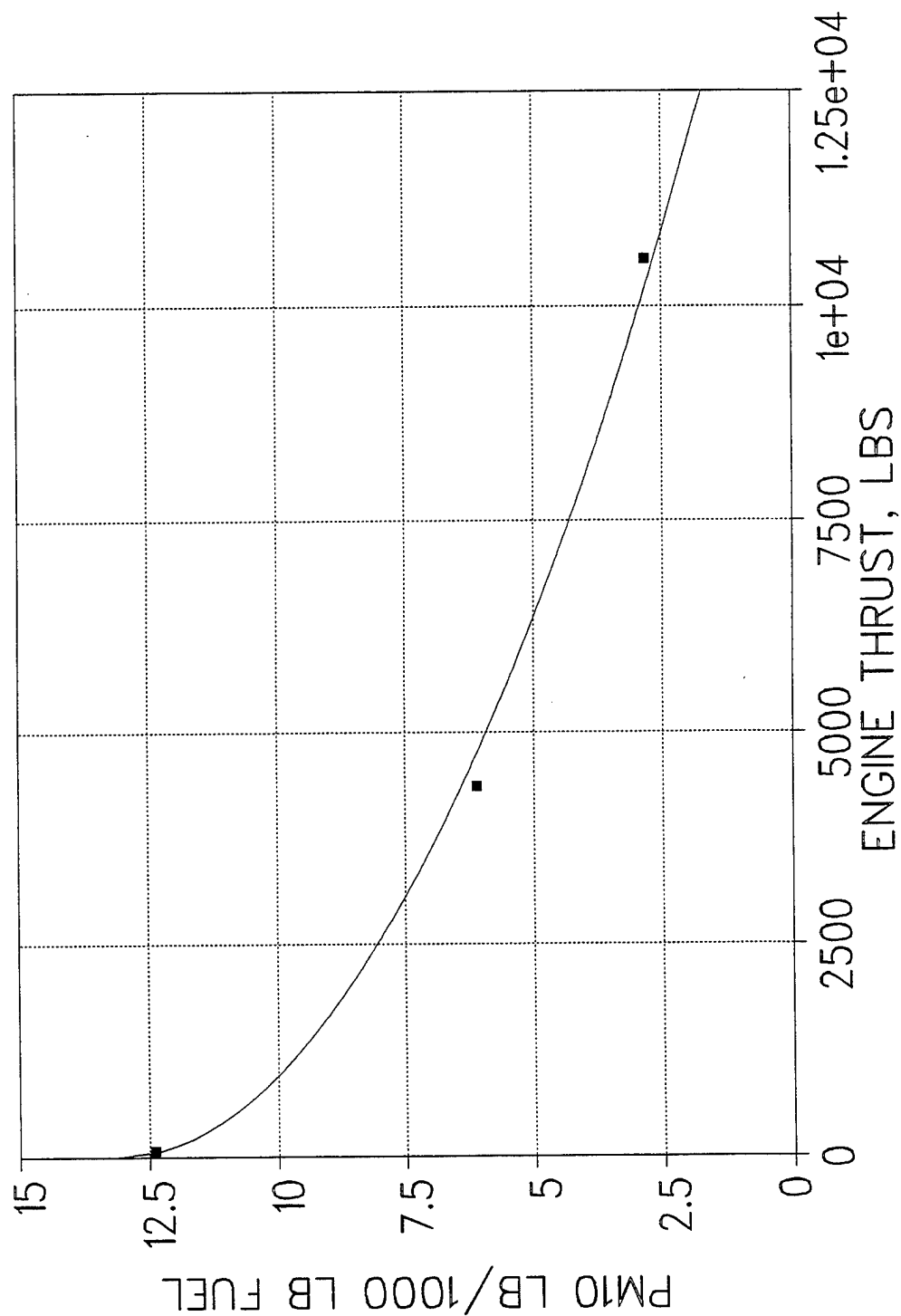
$$\begin{aligned}\text{THRUST}^{1.1722} &= (\text{FUEL FLOW} - 592.48) / 0.1549 \\ \text{LOG}(\text{THRUST}) * 1.1722 &= \text{LOG}((\text{FUEL FLOW} - 592.48) / 0.1549) \\ \text{LOG}(\text{THRUST}) &= \text{LOG}((\text{FUEL FLOW} - 592.48) / 0.1549) / 1.1722 \\ \text{THRUST} &= 10^{[\text{LOG}((\text{FUEL FLOW} - 592.48) / 0.1549) / 1.1722]}\end{aligned}$$

# PM10 EMISSION RATES, F404-GE-400 ENGINE

$$y=a+bx$$

$$a=13.172266$$

$$b=-0.10263079$$

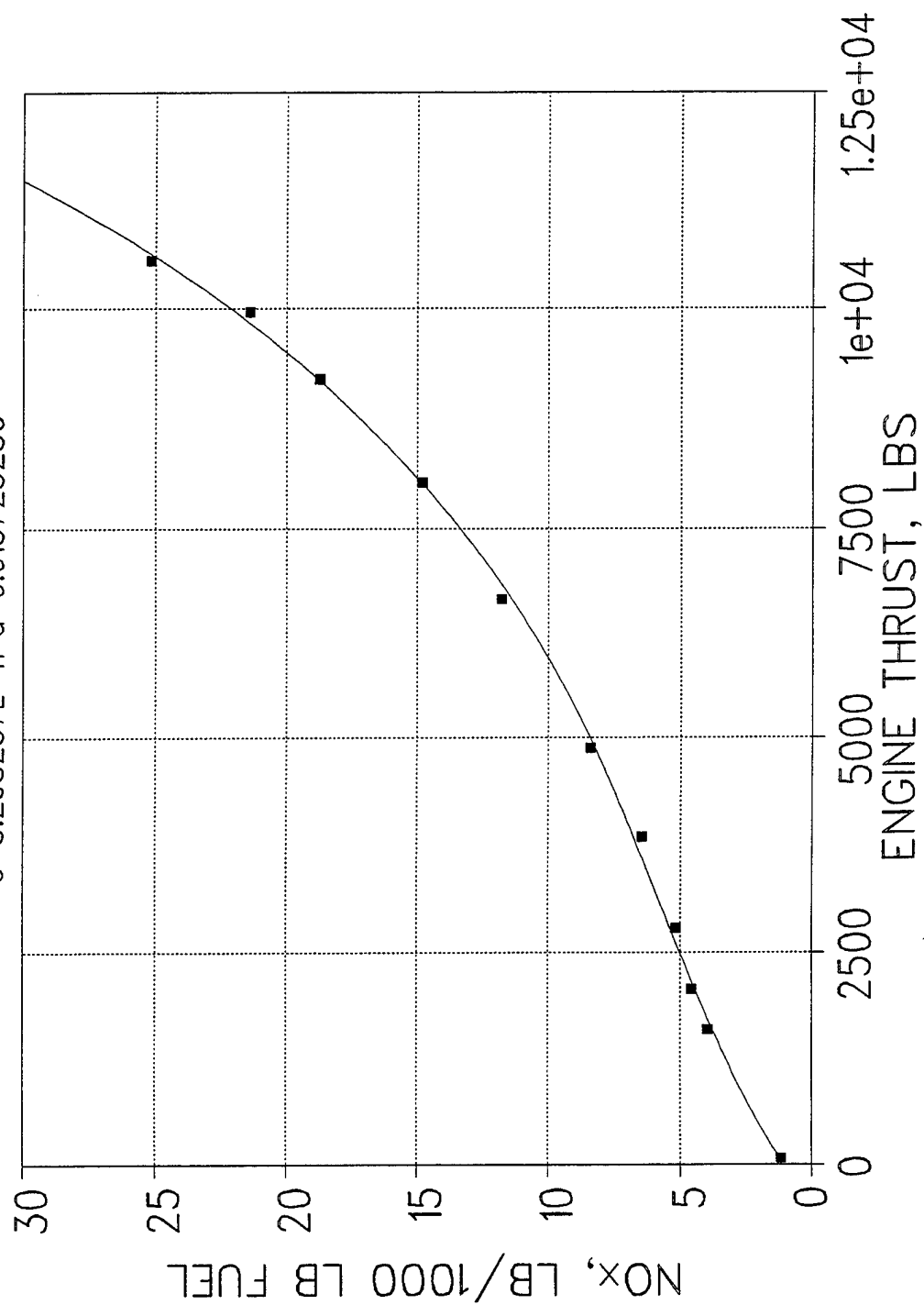


# NOx EMISSION RATES, F404-GE-400 ENGINE

$$y=a+bx^2\sqrt{x+cx^3}+dx/\ln x$$

a=0.94460832 b=-2.6723309E-09

c=3.298257E-11 d=0.013725236

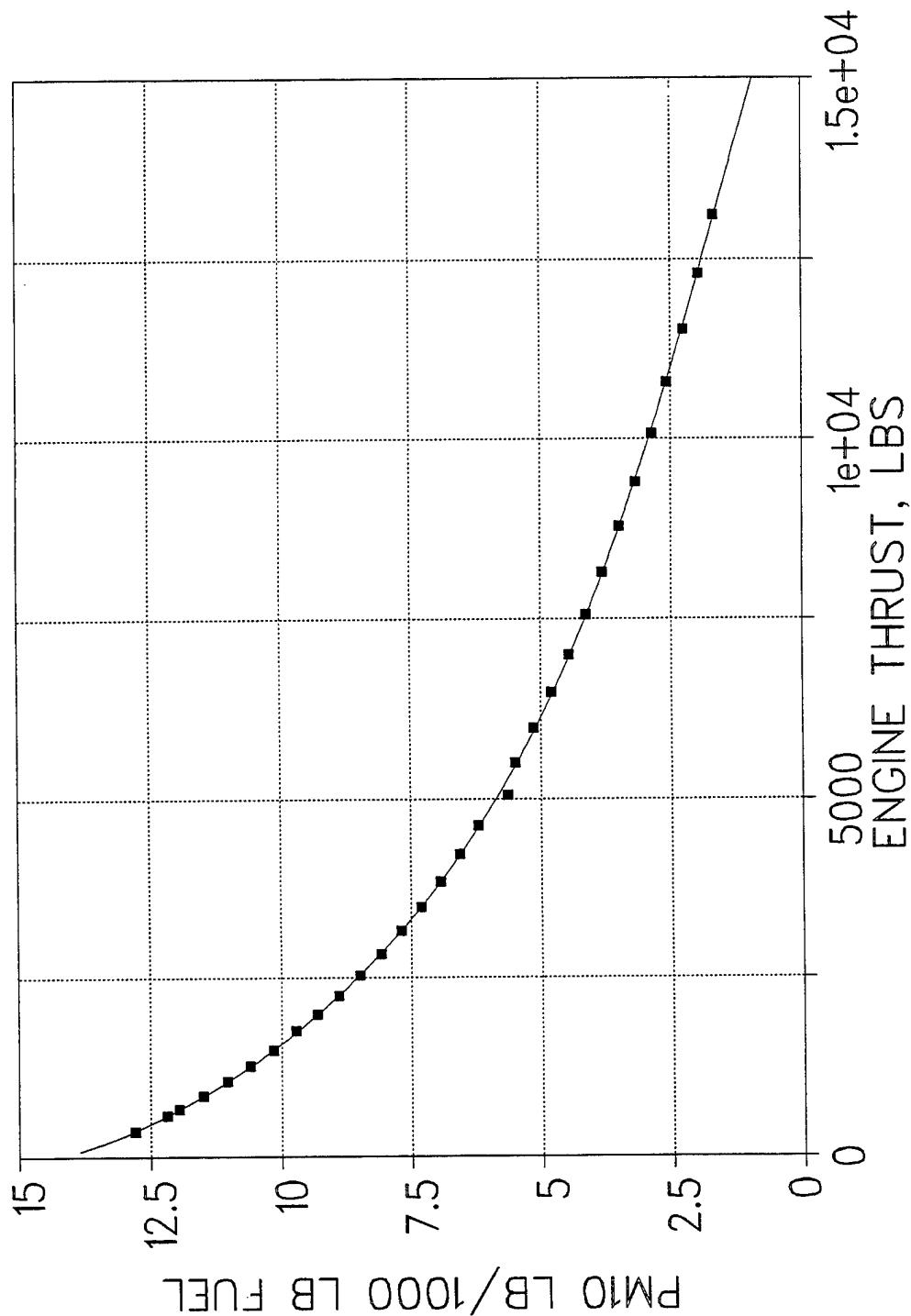


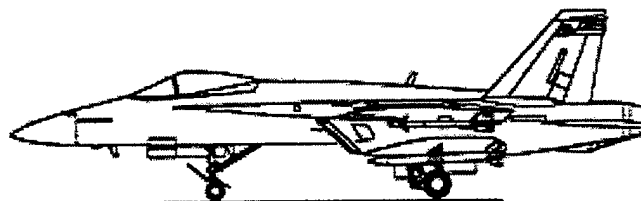
# PM10 EMISSION RATES, F/A-18E/F AIRCRAFT

$$y=a+bx+cx\ln x+dx^2\sqrt{x}$$

$$a=14.311656 \quad b=-0.0096978289$$

$$c=0.00094674805 \quad d=-1.6313632E-10$$





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MISCELLANEOUS MOBILE AND STATIONARY  
SOURCES

TABLE E-44. ESTIMATED EMISSIONS FROM AIRCRAFT SUPPORT EQUIPMENT USED BY ADDED F/A-18E/F AIRCRAFT

GSE Equipment Category	Vehicle/ Engine Fuel	Typical In-use HP Load Rating	Annual Number of Sorties	Equipment Use Per Sortie (minutes)	Emission Rate (grams per horsepower-hour)							Total Emissions from Annual GSE Equipment Use (tons/year)				
					Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter		
PHASE 1 ADDED AIRCRAFT (ALL ALTERNATIVES)																
TA-75 Tow Tractor	Gasoline	84	11,010	30	12.22	5.16	258.70	0.03	0.06	6.23	2.63	131.87	0.01	0.03		
JG-40 Tow Tractor	Gasoline	50	11,010	40	12.22	5.16	258.70	0.03	0.06	4.94	2.09	104.66	0.01	0.02		
Weapons Loader	JP-5	11	11,010	30	1.76	13.16	6.06	0.10	1.62	0.12	0.88	0.40	0.01	0.11		
PHASE 1 TOTALS																
					11.29	5.60	236.93	0.03	0.16							
PHASE 2 ADDED AIRCRAFT (NAF EL CENTRO ALTERNATIVE)																
TA-75 Tow Tractor	Gasoline	84	15,660	30	12.22	5.16	258.70	0.03	0.06	8.86	3.74	187.56	0.02	0.04		
JG-40 Tow Tractor	Gasoline	50	15,660	40	12.22	5.16	258.70	0.03	0.06	7.03	2.97	148.86	0.02	0.03		
Weapons Loader	JP-5	11	15,660	30	1.76	13.16	6.06	0.10	1.62	0.17	1.25	0.58	0.01	0.15		
PHASE 2 TOTALS																
					16.06	7.96	336.99	0.04	0.23							

TABLE E-44. ESTIMATED EMISSIONS FROM AIRCRAFT SUPPORT EQUIPMENT USED BY ADDED F/A-18E/F AIRCRAFT

Notes: Aircraft support equipment includes tow tractors, cargo loaders, and related aircraft service vehicles. Equipment types based on aircraft support equipment definitions in U.S. Environmental Protection Agency (1991) and F/A-18 squadron equipment items in U.S. Navy (1997c). Equipment use per aircraft sortie based on data for F/A-18 squadrons presented in U.S. Navy (1997c). Emission rates for gasoline-fueled equipment are from U.S. Environmental Protection Agency (1991), including EPA in-use adjustments. Emission rates for diesel engine equipment operated on JP-5 fuel are based on diesel emission rates (U.S. Environmental Protection Agency, 1991) multiplied by a JP-5 adjustment factor (Castro, 1997a): 10% increase for ROG, 6% decrease for NOx, no change for CO, and 1% increase for PM10. Sulfur oxide emission rate for equipment using JP-5 fuel is based on data for 80 horsepower hydraulic test stand equipment (Castro 1997a). In-use horsepower load values based on rated horsepower times a typical load factor of 40%. Phase 1 totals apply to all alternatives; Phase 2 totals apply only to the NAF E1 Centro Alternative.

Data Sources: Castro, Tim. 1997a. 10-08-97 Fax, Annual Emissions From NAS Lemoore "Huffers" and TSE.  
 U.S. Environmental Protection Agency. 1991. Nonroad Engine and Vehicle Emission Study - Report. (ANR-443). (NTIS # PB92126960).  
 U.S. Navy. 1997c. MCAS Miramar Conformity Analysis. Volume I.

TABLE E-45. EMISSION RATES FOR MISCELLANEOUS STATIONARY AND MOBILE SOURCES

SOURCE CATEGORY	TYPICAL SIZE OR QUANTITY	SIZE UNITS	STANDARD EMISSION FACTORS					EMISSION FACTOR		EMISSION FACTOR DATA SOURCE
			ROG	NOx	CO	SOx	PM10	UNITS		
JP-5 AIRCRAFT FUEL TRANSFERS, 40 F	1	MILLION GALLONS	19.26	0.00	0.00	0.00	0.00	LBS/MILLION GAL	AP-42, SECT 5.2 & 7.1; 40 DEG F	
JP-5 AIRCRAFT FUEL TRANSFERS, 50 F	1	MILLION GALLONS	27.63	0.00	0.00	0.00	0.00	LBS/MILLION GAL	AP-42, SECT 5.2 & 7.1; 50 DEG F	
JP-5 AIRCRAFT FUEL TRANSFERS, 60 F	1	MILLION GALLONS	38.39	0.00	0.00	0.00	0.00	LBS/MILLION GAL	AP-42, SECT 5.2 & 7.1; 60 DEG F	
JP-5 AIRCRAFT FUEL TRANSFERS, 70 F	1	MILLION GALLONS	48.75	0.00	0.00	0.00	0.00	LBS/MILLION GAL	AP-42, SECT 5.2 & 7.1; 70 DEG F	
JP-5 AIRCRAFT FUEL TRANSFERS, 80 F	1	MILLION GALLONS	65.24	0.00	0.00	0.00	0.00	LBS/MILLION GAL	AP-42, SECT 5.2 & 7.1; 80 DEG F	
JP-5 AIRCRAFT FUEL TRANSFERS, 90 F	1	MILLION GALLONS	89.68	0.00	0.00	0.00	0.00	LBS/MILLION GAL	AP-42, SECT 5.2 & 7.1; 90 DEG F	
JP-5 AIRCRAFT FUEL TRANSFERS, 100 F	1	MILLION GALLONS	121.63	0.00	0.00	0.00	0.00	LBS/MILLION GAL	AP-42, SECT 5.2 & 7.1; 100 DEG F	
NATURAL GAS BOILER, HANGAR	6.3	MILLION BTU/HR	3.83	81.00	61.00	0.60	12.00	LBS/MILLION SCF	AP-42, SECT 1.4 (<10 MMBTU, LOW NOx)	
NATURAL GAS BOILER, BEQ	4.2	MILLION BTU/HR	3.83	81.00	61.00	0.60	12.00	LBS/MILLION SCF	AP-42, SECT 1.4 (<10 MMBTU, LOW NOx)	
OFFICE/SHOP BLDG NATURAL GAS USE	1	MILLION BTU/HR	3.83	81.00	61.00	0.60	12.00	LBS/MILLION SCF	AP-42, SECT 1.4 (<10 MMBTU, LOW NOx)	
RESIDENTIAL NATURAL GAS USE	1	MILLION BTU/HR	7.26	94.00	40.00	0.60	11.18	LBS/MILLION SCF	AP-42, SECT 1.4 (RESIDENTIAL)	
ON-BASE SERVICE STATION	1	THOUSAND GAL/YR	1.70	0.00	0.00	0.00	0.00	LBS/1000 GALLONS	NAS LENOORE TITLE V TRACKING REPORT	
AIRCRAFT PAINTING	3.4	GALLONS/YR/PLANE	3.51	0.00	0.00	0.00	0.00	LBS/GALLON PAINT	ASSUME 420 GRAMS VOC/LITER	
SOLVENT USE	1.8	GALLONS/YR/PLANE	7.36	0.00	0.00	0.00	0.00	LBS/GAL SOLVENT	ASSUME 7.36 LB/GALLON, 100% VOLATILE	
ABRASIVE BLASTING	67.3	POUNDS/YR/PLANE	0.00	0.00	0.00	0.00	0.01	LBS/LB ABRASIVE	NAS LENOORE TITLE V TRACKING REPORT	

TABLE E-45. EMISSION RATES FOR MISCELLANEOUS STATIONARY AND MOBILE SOURCES

SOURCE CATEGORY	TYPICAL SIZE OR QUANTITY	SIZE UNITS	STANDARD EMISSION FACTORS					EMISSION FACTOR		EMISSION FACTOR DATA SOURCE
			ROG	NOx	CO	SOx	PM10	UNITS		
PORTABLE/STATIONARY DIESEL ENGINES	50	HORSEPOWER LOAD	2.51	30.86	6.68	2.05	2.20	LBS/1000 HP-HRS		AP-42, SECT 3.3
AIR START UNITS (JP-5)	4.0	HOURS/YR/PLANE	0.07	2.31	2.43	0.23	0.60	POUNDS/HOUR		MANUFACTURER DATA VIA NAS LEMOORE STAFF
HYDRAULIC TEST STAND ENGINES (JP-5)	5.5	HOURS/YR/PLANE	0.13	2.07	3.82	0.02	0.11	POUNDS/HOUR		MANUFACTURER DATA VIA NAS LEMOORE STAFF

## Data Sources:

Castro, Tim. 1997a. 10-08-97 Fax, Annual Emissions from NAS Lemoore "Huffers" and TSE. Fax sent by Tim Castro, NAS Lemoore.

Castro, Tim. 1997b. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

Hunn, Bruce D. (ed.). 1996. Fundamentals of Building Energy Dynamics.

U.S. Environmental Protection Agency. 1995. Compilation of Air Pollutant Emission Factors. 5th Edition. Volume I: Stationary Point and Area Sources. (AP-42).

TABLE E-46. MISCELLANEOUS EMISSION SOURCES, NAS LEMOORE ALTERNATIVE, YEAR 2000

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR						USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING, PARTIAL FRS	7.34	MILLION GAL/YEAR	0.151	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
AIRCRAFT REFUELING, 1 FLEET	2.68	MILLION GAL/YEAR	0.055	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
NATURAL GAS BOILER, BEQ	1.84	MILLION SCF/YEAR	0.004	0.075	0.056	0.001	0.011	5% OF RATED 4.2 MILLION BTU/HR CAPACITY	
NATURAL GAS USE, OFFICE/INDUSTRIAL	880	SCF GAS/YEAR	2E-06	4E-05	3E-05	3E-07	5E-06	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE	
NATURAL GAS USE, ON-BASE HOUSING	2,400	SCF GAS/YEAR	9E-06	1E-04	5E-05	7E-07	1E-05	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF	
NATURAL GAS USE, OFF-BASE HOUSING	8,692	SCF GAS/YEAR	3E-05	4E-04	2E-04	3E-06	5E-05	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF	
ON-BASE SERVICE STATION	223.9	THOUSAND GAL/YEAR	0.190	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE	
AIRCRAFT PAINTING	115.6	GALLONS/YEAR	0.203	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT	
SOLVENT USE	61.2	GALLONS/YEAR	0.225	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT	
ABRASIVE BLASTING	2,288	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.011	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT	
PORTABLE/STATIONARY DIESEL ENGINES	68.0	THOUSAND HP-HRS/YEAR	0.085	1.049	0.227	0.070	0.075	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT	
AIR START UNITS (JP-5)	136	HOURS/YEAR	0.005	0.157	0.165	0.016	0.041	4.0 HOURS/YEAR PER AIRCRAFT	
HYDRAULIC TEST STAND ENGINES (JP-5)	187	HOURS/YEAR	0.012	0.193	0.357	0.002	0.011	5.5 HOURS/YEAR PER AIRCRAFT	
AIRCRAFT REFUELING			0.206	0.000	0.000	0.000	0.000		
ON-BASE PERMIT-EXEMPT SOURCES			0.103	1.400	0.749	0.087	0.126		
ON-BASE NATURAL GAS USE			0.000	0.000	0.000	0.000	0.000		
ON-BASE PERMIT SOURCES			0.622	0.075	0.056	0.001	0.022		
OFF-BASE NATURAL GAS USE			0.000	0.000	0.000	0.000	0.000		

TABLE E-46. MISCELLANEOUS EMISSION SOURCES, NAS LEMOORE ALTERNATIVE, YEAR 2000

Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

Aircraft refueling emissions estimated for splash loading processes according to U.S. Environmental Protection Agency (1995). Fuel pit refueling requires only one fuel transfer (underground tank to aircraft). Fuel truck refueling requires two fuel transfers (underground tank to truck, truck to aircraft).

Aircraft refueling estimated to be 80% from fuel pit and 20% from fuel trucks (consistent with hot refueling factor).

Monthly temperature patterns for NAS Lemoore from WeatherDisc Associates (1990); see Table E-60.

Natural gas boilers for BEQ facilities assumed to be low-NOx commercial units with typical sizes based on data from Castro (1997b): one 8.4 million BTU/hour boiler for every two BEQs (about 300 spaces each).

Emission estimates for natural gas boilers based on data from U.S. Environmental Protection Agency (1995), assuming operation at 5% of rated capacity (actual NAS Lemoore natural gas use versus boiler capacity, based on data from Castro, 1997b).

Emission estimates for other natural gas use in nonresidential buildings based on low-NOx commercial systems (U.S. Environmental Protection Agency, 1995) and a natural gas requirement of 10 BTU per year per square foot of building space.

Emission estimates for natural gas use in on-base family housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 20 BTU per year per square foot of building space, and 1,200 square feet per family housing unit.

Emission estimates for natural gas use in off-base housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 24 BTU per year per square foot of building space, and 1,400 square feet per family housing unit; 700 off-base units assumed for the end of Phase 1.

The heating value of natural gas is assumed to be 1,000 BTU per standard cubic foot.

Natural gas requirements for different building types based on building type energy budgets (Hunn, 1996), assuming that natural gas furnishes about 30% of nonresidential building energy and about 50% of residential building energy.

On-base gasoline sales based on Navy exchange sales volume (Castro, 1997b) and current military employment at NAS Lemoore.

Emission rate from on-base gasoline sales based on data from Castro (1997b)./w/r

Per aircraft use of paints, solvents, and abrasive blasting media based on data from Castro (1997b) and 162 aircraft currently based at NAS Lemoore.

Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

Emission rates for miscellaneous diesel engines from U.S. Environmental Protection Agency (1995).

Per aircraft use and emission factors for air start units and hydraulic test stands based on data in Castro (1997a).

Calendar year assumptions for aircraft arrivals and flight operations are presented in Table E-33.

Calendar year assumptions for new building construction are presented in Table E-1; construction is assumed to occur the year prior to building use.

Data Sources:

Castro, Tim. 1997a. 10-08-97 Fax, Annual Emissions from NAS Lemoore "Huffers" and TSE. Fax sent by Tim Castro, NAS Lemoore.

Castro, Tim. 1997b. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

Hunn, Bruce D. (ed.). 1996. Fundamentals of Building Energy Dynamics.

U.S. Environmental Protection Agency. 1995. Compilation of Air Pollutant Emission Factors. 5th Edition. Volume I: Stationary Point and Area Sources. (AP-42).

U.S. Navy. 1997c. MCAS Miramar Conformity Analysis. Volumes I and II. Southwest Division. San Diego, CA.

WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-47. MISCELLANEOUS EMISSION SOURCES, NAS LEHOORE ALTERNATIVE, YEAR 2001

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10	
AIRCRAFT REFUELING, FULL FRS	13.21	MILLION GAL/YEAR	0.272	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING
AIRCRAFT REFUELING, 2 FLEET	5.35	MILLION GAL/YEAR	0.110	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING
NATURAL GAS BOILER, BEQs	3.68	MILLION SCF/YEAR	0.007	0.149	0.112	0.001	0.022	5% OF RATED 4.2 MILLION BTU/HR CAPACITY
NATURAL GAS USE, OFFICE/INDUSTRIAL	1.136	SCF GAS/YEAR	2E-06	5E-05	3E-05	3E-07	7E-06	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE
NATURAL GAS USE, ON-BASE HOUSING	4.800	SCF GAS/YEAR	2E-05	2E-04	1E-04	1E-06	3E-05	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF
NATURAL GAS USE, OFF-BASE HOUSING	16.362	SCF GAS/YEAR	6E-05	8E-04	3E-04	5E-06	9E-05	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF
ON-BASE SERVICE STATION	421.4	THOUSAND GAL/YEAR	0.358	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE
AIRCRAFT PAINTING	217.6	GALLONS/YEAR	0.381	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT
SOLVENT USE	115.2	GALLONS/YEAR	0.424	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT
ABRASIVE BLASTING	4,307	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.022	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT
PORTABLE/STATIONARY DIESEL ENGINES	128	THOUSAND HP-HRS/YEAR	0.161	1.975	0.428	0.131	0.141	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT
AIR START UNITS (JP-5)	256	HOURS/YEAR	0.009	0.296	0.311	0.029	0.076	4.0 HOURS/YEAR PER AIRCRAFT
HYDRAULIC TEST STAND ENGINES (JP-5)	352	HOURS/YEAR	0.023	0.364	0.672	0.003	0.020	5.5 HOURS/YEAR PER AIRCRAFT
AIRCRAFT REFUELING			0.382	0.000	0.000	0.000	0.000	
ON-BASE PERMIT-EXEMPT SOURCES			0.193	2.635	1.411	0.164	0.237	
ON-BASE NATURAL GAS USE			0.000	0.000	0.000	0.000	0.000	
ON-BASE PERMIT SOURCES			1.171	0.149	0.112	0.001	0.044	
OFF-BASE NATURAL GAS USE			0.000	0.001	0.000	0.000	0.000	

TABLE E-47. MISCELLANEOUS EMISSION SOURCES, NAS LEMOORE ALTERNATIVE, YEAR 2001

Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

Aircraft refueling emissions estimated for splash loading processes according to U.S. Environmental Protection Agency (1995). Fuel pit refueling requires only one fuel transfer (underground tank to aircraft). Fuel truck refueling requires two fuel transfers (underground tank to truck, truck to aircraft).

Aircraft refueling estimated to be 80% from fuel pit and 20% from fuel trucks (consistent with hot refueling factor).

Monthly temperature patterns for NAS Lemoore from WeatherDisc Associates (1990); see Table E-60.

Natural gas boilers for BEQ facilities assumed to be low-NOX commercial units with typical sizes based on data from Castro (1997b): one 8.4 million BTU/hour boiler for every two BEQs (about 300 spaces each).

Emission estimates for natural gas boilers based on data from U.S. Environmental Protection Agency (1995), assuming operation at 5% of rated capacity (actual NAS Lemoore natural gas use versus boiler capacity, based on data from Castro, 1997b).

Emission estimates for other natural gas use in nonresidential buildings based on low-NOX commercial systems (U.S. Environmental Protection Agency, 1995) and a natural gas requirement of 10 BTU per year per square foot of building space.

Emission estimates for natural gas use in on-base family housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 20 BTU per year per square foot of building space, and 1,200 square feet per family housing unit.

Emission estimates for natural gas use in off-base housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 24 BTU per year per square foot of building space, and 1,400 square feet per family housing unit; 700 off-base units assumed for the end of Phase 1.

The heating value of natural gas is assumed to be 1,000 BTU per standard cubic foot.

Natural gas requirements for different building types based on building type energy budgets (Hunn, 1996), assuming that natural gas furnishes about 30% of nonresidential building energy and about 50% of residential building energy.

On-base gasoline sales based on Navy exchange sales volume (Castro, 1997b) and current military employment at NAS Lemoore.

Emission rate from on-base gasoline sales based on data from Castro (1997b).wir

Per aircraft use of paints, solvents, and abrasive blasting media based on data from Castro (1997b) and 162 aircraft currently based at NAS Lemoore.

Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

Emission rates for miscellaneous diesel engines from U.S. Environmental Protection Agency (1995).

Per aircraft use and emission factors for air start units and hydraulic test stands based on data in Castro (1997a).

Calendar year assumptions for aircraft arrivals and flight operations are presented in Table E-33.

Calendar year assumptions for new building construction are presented in Table E-1; construction is assumed to occur the year prior to building use.

Data Sources:

Castro, Tim. 1997a. 10-08-97 Fax, Annual Emissions from NAS Lemoore "Huffers" and TSE. Fax sent by Tim Castro, NAS Lemoore.

Castro, Tim. 1997b. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

Hunn, Bruce D. (ed.). 1996. Fundamentals of Building Energy Dynamics.

U.S. Environmental Protection Agency. 1995. Compilation of Air Pollutant Emission Factors. 5th Edition. Volume I: Stationary Point and Area Sources. (AP-42).

U.S. Navy. 1997c. MCAS Miramar Conformity Analysis. Volumes I and II. Southwest Division. San Diego, CA.

WeatherDisc Associates. 1990. Worldwide Airfield Summaries (ID-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-48. MISCELLANEOUS EMISSION SOURCES, NAS LEMOORE ALTERNATIVE, YEAR 2002

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10	
AIRCRAFT REFUELING, FULL FRS	13.21	MILLION GAL/YEAR	0.272	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING
AIRCRAFT REFUELING, 3 FLEET	8.03	MILLION GAL/YEAR	0.165	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING
NATURAL GAS BOILER, BEQS	3.68	MILLION SCF/YEAR	0.007	0.149	0.112	0.001	0.022	5% OF RATED 4.2 MILLION BTU/HR CAPACITY
NATURAL GAS USE, OFFICE/INDUSTRIAL	1,295	SCF GAS/YEAR	2E-06	5E-05	4E-05	4E-07	8E-06	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE
NATURAL GAS USE, ON-BASE HOUSING	7,200	SCF GAS/YEAR	3E-05	3E-04	1E-04	2E-06	4E-05	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF
NATURAL GAS USE, OFF-BASE HOUSING	19,941	SCF GAS/YEAR	7E-05	9E-04	4E-04	6E-06	1E-04	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF
ON-BASE SERVICE STATION	513.6	THOUSAND GAL/YEAR	0.437	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE
AIRCRAFT PAINTING	265.2	GALLONS/YEAR	0.465	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT
SOLVENT USE	140.4	GALLONS/YEAR	0.517	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT
ABRASIVE BLASTING	5,249	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.026	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT
PORTABLE/STATIONARY DIESEL ENGINES	156.0	THOUSAND HP-HRS/YEAR	0.196	2.407	0.521	0.160	0.172	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT
AIR START UNITS (JP-5)	312	HOURS/YEAR	0.011	0.360	0.379	0.036	0.093	4.0 HOURS/YEAR PER AIRCRAFT
HYDRAULIC TEST STAND ENGINES (JP-5)	429	HOURS/YEAR	0.028	0.443	0.820	0.004	0.024	5.5 HOURS/YEAR PER AIRCRAFT
<hr/>								
AIRCRAFT REFUELING			0.437	0.000	0.000	0.000	0.000	
ON-BASE PERMIT-EXEMPT SOURCES			0.235	3.211	1.719	0.200	0.289	
ON-BASE NATURAL GAS USE			0.000	0.000	0.000	0.000	0.000	
ON-BASE PERMIT SOURCES			1.425	0.149	0.112	0.001	0.048	
OFF-BASE NATURAL GAS USE			0.000	0.001	0.000	0.000	0.000	

TABLE E-4B. MISCELLANEOUS EMISSION SOURCES, NAS LEMOORE ALTERNATIVE, YEAR 2002

Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

Aircraft refueling emissions estimated for splash loading processes according to U.S. Environmental Protection Agency (1995). Fuel pit refueling requires only one fuel transfer (underground tank to aircraft). Fuel truck refueling requires two fuel transfers (underground tank to truck, truck to aircraft).

Aircraft refueling estimated to be 80% from fuel pit and 20% from fuel trucks (consistent with hot refueling factor).

Monthly temperature patterns for NAS Lemoore from WeatherDisc Associates (1990); see Table E-60.

Natural gas boilers for BEQ facilities assumed to be low-NOx commercial units with typical sizes based on data from Castro (1997b): one 8.4 million BTU/hour boiler for every two BEQs (about 300 spaces each).

Emission estimates for natural gas boilers based on data from U.S. Environmental Protection Agency (1995), assuming operation at 5% of rated capacity (actual NAS Lemoore natural gas use versus boiler capacity, based on data from Castro, 1997b).

Emission estimates for other natural gas use in nonresidential buildings based on low-NOx commercial systems (U.S. Environmental Protection Agency, 1995) and a natural gas requirement of 10 BTU per year per square foot of building space.

Emission estimates for natural gas use in on-base family housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 20 BTU per year per square foot of building space, and 1,200 square feet per family housing unit.

Emission estimates for natural gas use in off-base housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 24 BTU per year per square foot of building space, and 1,400 square feet per family housing unit; 700 off-base units assumed for the end of Phase 1.

The heating value of natural gas is assumed to be 1,000 BTU per standard cubic foot.

Natural gas requirements for different building types based on building type energy budgets (Hunn, 1996), assuming that natural gas furnishes about 30% of nonresidential building energy and about 50% of residential building energy.

On-base gasoline sales based on Navy exchange sales volume (Castro, 1997b) and current military employment at NAS Lemoore.

Emission rate from on-base gasoline sales based on data from Castro (1997b)/w/ir

Per aircraft use of paints, solvents, and abrasive blasting media based on data from Castro (1997b) and 162 aircraft currently based at NAS Lemoore.

Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

Emission rates for miscellaneous diesel engines from U.S. Environmental Protection Agency (1995).

Per aircraft use and emission factors for air start units and hydraulic test stands based on data in Castro (1997a).

Calendar year assumptions for aircraft arrivals and flight operations are presented in Table E-33.

Calendar year assumptions for new building construction are presented in Table E-1; construction is assumed to occur the year prior to building use.

Data Sources:

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Hunn, Bruce D. (ed.). 1996. Fundamentals of Building Energy Dynamics.

U.S. Environmental Protection Agency. 1995. Compilation of Air Pollutant Emission Factors. 5th Edition. Volume I: Stationary Point and Area Sources. (AP-42).

U.S. Navy. 1997c. MCAS Miramar Conformity Analysis. Volumes I and II. Southwest Division. San Diego, CA.

WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-49. MISCELLANEOUS EMISSION SOURCES, NAS LEMOORE ALTERNATIVE, YEARS 2003 - 2010

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS	
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING, FULL FRS	13.21	MILLION GAL/YEAR	0.272	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
AIRCRAFT REFUELING, 4 FLEET	10.70	MILLION GAL/YEAR	0.220	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
NATURAL GAS BOILER, BEQS	3.68	MILLION SCF/YEAR	0.007	0.149	0.112	0.001	0.022	5% OF RATED 4.2 MILLION BTU/HR CAPACITY	
NATURAL GAS USE, OFFICE/INDUSTRIAL	1,295	SCF GAS/YEAR	2E-06	5E-05	4E-05	4E-07	8E-06	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE	
NATURAL GAS USE, ON-BASE HOUSING	9,576	SCF GAS/YEAR	3E-05	5E-04	2E-04	3E-06	5E-05	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF	
NATURAL GAS USE, OFF-BASE HOUSING	23,520	SCF GAS/YEAR	9E-05	1E-03	5E-04	7E-06	1E-04	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF	
ON-BASE SERVICE STATION	605.8	THOUSAND GAL/YEAR	0.515	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE	
AIRCRAFT PAINTING	312.8	GALLONS/YEAR	0.548	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT	
SOLVENT USE	165.6	GALLONS/YEAR	0.609	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT	
ABRASIVE BLASTING	6,192	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.031	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT	
PORTABLE/STATIONARY DIESEL ENGINES	184.0	THOUSAND HP-HRS/YEAR	0.231	2.840	0.615	0.189	0.203	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT	
AIR START UNITS (JP-5)	368	HOURS/YEAR	0.013	0.425	0.447	0.042	0.110	4.0 HOURS/YEAR PER AIRCRAFT	
HYDRAULIC TEST STAND ENGINES (JP-5)	506	HOURS/YEAR	0.033	0.523	0.967	0.004	0.029	5.5 HOURS/YEAR PER AIRCRAFT	
AIRCRAFT REFUELING			0.492	0.000	0.000	0.000	0.000		
ON-BASE PERMIT-EXEMPT SOURCES			0.278	3.787	2.028	0.235	0.341		
ON-BASE NATURAL GAS USE			0.000	0.001	0.000	0.000	0.000		
ON-BASE PERMIT SOURCES			1.680	0.149	0.112	0.001	0.053		
OFF-BASE NATURAL GAS USE			0.000	0.001	0.000	0.000	0.000		

## Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

Aircraft refueling emissions estimated for splash loading processes according to U.S. Environmental Protection Agency (1995). Fuel pit refueling requires only one fuel transfer (underground tank to aircraft). Fuel truck refueling requires two fuel transfers (underground tank to truck, truck to aircraft).

Aircraft refueling estimated to be 80% from fuel pit and 20% from fuel trucks (consistent with hot refueling factor).

Monthly temperature patterns for NAS Lemoore from WeatherDisc Associates (1990); see Table E-60.

Natural gas boilers for BEQ facilities assumed to be low-NOx commercial units with typical sizes based on data from Castro (1997b): one 8.4 million BTU/hour boiler for every two BEQs (about 300 spaces each).

Emission estimates for natural gas boilers based on data from U.S. Environmental Protection Agency (1995), assuming operation at 5% of rated capacity (actual NAS Lemoore natural gas use versus boiler capacity, based on data from Castro, 1997b).

Emission estimates for other natural gas use in nonresidential buildings based on low-NOx commercial systems (U.S. Environmental Protection Agency, 1995) and a natural gas requirement of 10 BTU per year per square foot of building space.

Emission estimates for natural gas use in on-base family housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 20 BTU per year per square foot of building space, and 1,200 square feet per family housing unit.

Emission estimates for natural gas use in off-base housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 24 BTU per year per square foot of building space, and 1,400 square feet per family housing unit; 700 off-base units assumed for the end of Phase 1.

The heating value of natural gas is assumed to be 1,000 BTU per standard cubic foot.

Natural gas requirements for different building types based on building type energy budgets (Hunn, 1996), assuming that natural gas furnishes about 30% of nonresidential building energy and about 50% of residential building energy.

On-base gasoline sales based on Navy exchange sales volume (Castro, 1997b) and current military employment at NAS Lemoore.

Emission rate from on-base gasoline sales based on data from Castro (1997b)./wir

Per aircraft use of paints, solvents, and abrasive blasting media based on data from Castro (1997b) and 162 aircraft currently based at NAS Lemoore.

Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

Emission rates for miscellaneous diesel engines from U.S. Environmental Protection Agency (1995).

Per aircraft use and emission factors for air start units and hydraulic test stands based on data in Castro (1997a).

Calendar year assumptions for aircraft arrivals and flight operations are presented in Table E-33.

Calendar year assumptions for new building construction are presented in Table E-1; construction is assumed to occur the year prior to building use.

## Data Sources:

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Castro, Tim. 1997b. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

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U.S. Environmental Protection Agency. 1995. Compilation of Air Pollutant Emission Factors. 5th Edition. Volume I: Stationary Point and Area Sources. (AP-42).

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WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-50. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2000

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR						USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOX	CO	SOx	PM10		
AIRCRAFT REFUELING, PARTIAL FRS	7.34	MILLION GAL/YEAR	0.223	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
AIRCRAFT REFUELING, 1 FLEET	2.68	MILLION GAL/YEAR	0.081	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
NATURAL GAS BOILER, HANGAR	2.76	MILLION SCF/YEAR	0.005	0.112	0.084	0.001	0.017	5% OF RATED 6.3 MILLION BTU/HR CAPACITY	
NATURAL GAS BOILER FOR BEQ, BOQ	1.84	MILLION SCF/YEAR	0.004	0.075	0.056	0.001	0.011	5% OF RATED 4.2 MILLION BTU/HR CAPACITY	
NATURAL GAS USE, OFFICE/INDUSTRIAL	1,458	SCF GAS/YEAR	3E-06	6E-05	4E-05	4E-07	9E-06	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE	
NATURAL GAS USE, ON-BASE HOUSING	2,400	SCF GAS/YEAR	9E-06	1E-04	5E-05	7E-07	1E-05	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF	
NATURAL GAS USE, OFF-BASE HOUSING	8,133	SCF GAS/YEAR	3E-05	4E-04	2E-04	2E-06	5E-05	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF	
ON-BASE SERVICE STATION	223.9	THOUSAND GAL/YEAR	0.190	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE	
AIRCRAFT PAINTING	115.6	GALLONS/YEAR	0.203	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT	
SOLVENT USE	61.2	GALLONS/YEAR	0.225	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT	
ABRASIVE BLASTING	2,288	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.011	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT	
PORTABLE/STATIONARY DIESEL ENGINES	68.0	THOUSAND HP-HRS/YEAR	0.085	1.049	0.227	0.070	0.075	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT	
AIR START UNITS (JP-5)	136	HOURS/YEAR	0.005	0.157	0.165	0.016	0.041	4.0 HOURS/YEAR PER AIRCRAFT	
HYDRAULIC TEST STAND ENGINES (JP-5)	187	HOURS/YEAR	0.012	0.193	0.357	0.002	0.011	5.5 HOURS/YEAR PER AIRCRAFT	

TABLE E-50. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2000

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS	
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING									
ON-BASE PERMIT-EXEMPT SOURCES			0.305	0.000	0.000	0.000	0.000		
ON-BASE NATURAL GAS USE			0.103	1.400	0.749	0.087	0.126		
ON-BASE PERMIT SOURCES			0.000	0.000	0.000	0.000	0.000		
OFF-BASE NATURAL GAS USE			0.627	0.186	0.140	0.001	0.039		
			0.000	0.000	0.000	0.000	0.000		

## Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

Aircraft refueling emissions estimated for splash loading processes according to U.S. Environmental Protection Agency (1995). Fuel pit refueling requires only one fuel transfer (underground tank to aircraft). Fuel truck refueling requires two fuel transfers (underground tank to truck, truck to aircraft).

Aircraft refueling estimated to be 80% from fuel pit and 20% from fuel trucks (consistent with hot refueling factor).

Monthly temperature patterns for NAF El Centro from WeatherDisc Associates (1990); see Table E-60.

Natural gas boilers for BEQ facilities assumed to be low-NOx commercial units with typical sizes based on data from Castro (1997b): one 8.4 million BTU/hour boiler for every two BEQs (about 300 spaces each).

Emission estimates for natural gas boilers based on data from U.S. Environmental Protection Agency (1995), assuming operation at 5% of rated capacity (actual NAS Lemoore natural gas use versus boiler capacity, based on data from Castro, 1997b).

Emission estimates for other natural gas use in nonresidential buildings based on low-NOx commercial systems (U.S. Environmental Protection Agency, 1995) and a natural gas requirement of 10 BTU per year per square foot of building space.

Emission estimates for natural gas use in on-base family housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 20 BTU per year per square foot of building space, and 1,200 square feet per family housing unit.

Emission estimates for natural gas use in off-base housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 24 BTU per year per square foot of building space, and 1,400 square feet per family housing unit; 655 off-base units for Phase 1, 1,246 units for Phase 2.

The heating value of natural gas is assumed to be 1,000 BTU per standard cubic foot.

Natural gas requirements for different building types based on building type energy budgets (Hunn, 1996), assuming that natural gas furnishes about 30% of nonresidential building energy and about 50% of residential building energy.

On-base gasoline sales based on NAS Lemoore Navy exchange sales volume (Castro, 1997b) and current military employment at NAS Lemoore.

Emission rate from on-base gasoline sales based on data from NAS Lemoore (Castro, 1997b).

Per aircraft use of paints, solvents, and abrasive blasting media based on data from NAS Lemoore (Castro, 1997b) and 162 aircraft currently at NAS Lemoore.

Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

TABLE E-50. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2000

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

Emission rates for miscellaneous diesel engines from U.S. Environmental Protection Agency (1995).

Per aircraft use and emission factors for air start units and hydraulic test stands based on data in Castro (1997a).

Calendar year assumptions for aircraft arrivals and flight operations are presented in Table E-33.

Calendar year assumptions for new building construction are presented in Table E-10; construction is assumed to occur the year prior to building use.

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WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-51. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2001

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR						USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING, FULL FRS	13.21	MILLION GAL/YEAR	0.402	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
AIRCRAFT REFUELING, 2 FLEET	5.35	MILLION GAL/YEAR	0.163	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
NATURAL GAS BOILER, HANGAR	2.76	MILLION SCF/YEAR	0.005	0.112	0.084	0.001	0.017	5% OF RATED 6.3 MILLION BTU/HR CAPACITY	
NATURAL GAS BOILER FOR BEQ, BOQ	3.68	MILLION SCF/YEAR	0.007	0.149	0.112	0.001	0.022	5% OF RATED 4.2 MILLION BTU/HR CAPACITY	
NATURAL GAS USE, OFFICE/INDUSTRIAL	2,878	SCF GAS/YEAR	6E-06	1E-04	9E-05	9E-07	2E-05	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE	
NATURAL GAS USE, ON-BASE HOUSING	4,800	SCF GAS/YEAR	2E-05	2E-04	1E-04	1E-06	3E-05	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF	
NATURAL GAS USE, OFF-BASE HOUSING	15,310	SCF GAS/YEAR	6E-05	7E-04	3E-04	5E-06	9E-05	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF	
ON-BASE SERVICE STATION	421.4	THOUSAND GAL/YEAR	0.358	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE	
AIRCRAFT PAINTING	217.6	GALLONS/YEAR	0.381	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT	
SOLVENT USE	115.2	GALLONS/YEAR	0.424	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT	
ABRASIVE BLASTING	4,307	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.022	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT	
PORTABLE/STATIONARY DIESEL ENGINES	128.0	THOUSAND HP-HRS/YEAR	0.161	1.975	0.428	0.131	0.141	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT	
AIR START UNITS (JP-5)	256	HOURS/YEAR	0.009	0.296	0.311	0.029	0.076	4.0 HOURS/YEAR PER AIRCRAFT	
HYDRAULIC TEST STAND ENGINES (JP-5)	352	HOURS/YEAR	0.023	0.364	0.672	0.003	0.020	5.5 HOURS/YEAR PER AIRCRAFT	

TABLE E-51. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2001

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10	
AIRCRAFT REFUELING			0.564	0.000	0.000	0.000	0.000	
ON-BASE PERMIT-EXEMPT SOURCES			0.193	2.635	1.411	0.164	0.237	
ON-BASE NATURAL GAS USE			0.000	0.000	0.000	0.000	0.000	
ON-BASE PERMIT SOURCES			1.176	0.261	0.196	0.002	0.060	
OFF-BASE NATURAL GAS USE			0.000	0.001	0.000	0.000	0.000	

## Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

Aircraft refueling emissions estimated for splash loading processes according to U.S. Environmental Protection Agency (1995). Fuel pit refueling requires only one fuel transfer (underground tank to aircraft). Fuel truck refueling requires two fuel transfers (underground tank to truck, truck to aircraft).

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Emission estimates for natural gas use in off-base housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 24 BTU per year per square foot of building space, and 1,400 square feet per family housing unit; 655 off-base units for Phase 1, 1,246 units for Phase 2.

The heating value of natural gas is assumed to be 1,000 BTU per standard cubic foot.

Natural gas requirements for different building types based on building type energy budgets (Hunn, 1996), assuming that natural gas furnishes about 30% of nonresidential building energy and about 50% of residential building energy.

On-base gasoline sales based on NAS Lemoore Navy exchange sales volume (Castro, 1997b) and current military employment at NAS Lemoore.

Emission rate from on-base gasoline sales based on data from NAS Lemoore (Castro, 1997b).

Per aircraft use of paints, solvents, and abrasive blasting media based on data from NAS Lemoore (Castro, 1997b) and 162 aircraft currently at NAS Lemoore.

Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

TABLE E-51. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2001

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

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Per aircraft use and emission factors for air start units and hydraulic test stands based on data in Castro (1997a).

Calendar year assumptions for aircraft arrivals and flight operations are presented in Table E-33.

Calendar year assumptions for new building construction are presented in Table E-10; construction is assumed to occur the year prior to building use.

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WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-52. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2002

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10	
AIRCRAFT REFUELING, FULL FRS	13.21	MILLION GAL/YEAR	0.402	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING
AIRCRAFT REFUELING, 3 FLEET	8.03	MILLION GAL/YEAR	0.244	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING
NATURAL GAS BOILER, HANGAR	2.76	MILLION SCF/YEAR	0.005	0.112	0.084	0.001	0.017	5% OF RATED 6.3 MILLION BTU/HR CAPACITY
NATURAL GAS BOILER FOR BEQ, BOQ	3.68	MILLION SCF/YEAR	0.007	0.149	0.112	0.001	0.022	5% OF RATED 4.2 MILLION BTU/HR CAPACITY
NATURAL GAS USE, OFFICE/INDUSTRIAL	3.051	SCF GAS/YEAR	6E-06	1E-04	9E-05	9E-07	2E-05	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE
NATURAL GAS USE, ON-BASE HOUSING	7.200	SCF GAS/YEAR	3E-05	3E-04	1E-04	2E-06	4E-05	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF
NATURAL GAS USE, OFF-BASE HOUSING	18.659	SCF GAS/YEAR	7E-05	9E-04	4E-04	6E-06	1E-04	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF
ON-BASE SERVICE STATION	513.6	THOUSAND GAL/YEAR	0.437	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE
AIRCRAFT PAINTING	265.2	GALLONS/YEAR	0.465	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT
SOLVENT USE	140.4	GALLONS/YEAR	0.517	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT
ABRASIVE BLASTING	5.249	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.026	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT
PORTABLE/STATIONARY DIESEL ENGINES	156.0	THOUSAND HP-HRS/YEAR	0.196	2.407	0.521	0.160	0.172	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT
AIR START UNITS (JP-5)	312	HOURS/YEAR	0.011	0.360	0.379	0.036	0.093	4.0 HOURS/YEAR PER AIRCRAFT
HYDRAULIC TEST STAND ENGINES (JP-5)	429	HOURS/YEAR	0.028	0.443	0.820	0.004	0.024	5.5 HOURS/YEAR PER AIRCRAFT

TABLE E-52. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2002

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR						USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING			0.646	0.000	0.000	0.000	0.000		
ON-BASE PERMIT-EXEMPT SOURCES			0.235	3.211	1.719	0.200	0.289		
ON-BASE NATURAL GAS USE			0.000	0.000	0.000	0.000	0.000		
ON-BASE PERMIT SOURCES			1.430	0.261	0.196	0.002	0.065		
OFF-BASE NATURAL GAS USE			0.000	0.001	0.000	0.000	0.000		

## Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

Aircraft refueling emissions estimated for splash loading processes according to U.S. Environmental Protection Agency (1995). Fuel pit refueling requires only one fuel transfer (underground tank to aircraft). Fuel truck refueling requires two fuel transfers (underground tank to truck, truck to aircraft).

Aircraft refueling estimated to be 80% from fuel pit and 20% from fuel trucks (consistent with hot refueling factor).

Monthly temperature patterns for NAF El Centro from WeatherDisc Associates (1990); see Table E-60.

Natural gas boilers for BEQ facilities assumed to be low-NOx commercial units with typical sizes based on data from Castro (1997b): one 8.4 million BTU/hour boiler for every two BEQs (about 300 spaces each).

Emission estimates for natural gas boilers based on data from U.S. Environmental Protection Agency (1995), assuming operation at 5% of rated capacity (actual NAS Lemoore natural gas use versus boiler capacity, based on data from Castro, 1997b).

Emission estimates for other natural gas use in nonresidential buildings based on low-NOx commercial systems (U.S. Environmental Protection Agency, 1995) and a natural gas requirement of 10 BTU per year per square foot of building space.

Emission estimates for natural gas use in on-base family housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 20 BTU per year per square foot of building space, and 1,200 square feet per family housing unit.

Emission estimates for natural gas use in off-base housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 24 BTU per year per square foot of building space, and 1,400 square feet per family housing unit; 655 off-base units for Phase 1, 1,246 units for Phase 2.

The heating value of natural gas is assumed to be 1,000 BTU per standard cubic foot.

Natural gas requirements for different building types based on building type energy budgets (Hunn, 1996), assuming that natural gas furnishes about 30% of nonresidential building energy and about 50% of residential building energy.

On-base gasoline sales based on NAS Lemoore Navy exchange sales volume (Castro, 1997b) and current military employment at NAS Lemoore.

Emission rate from on-base gasoline sales based on data from NAS Lemoore (Castro, 1997b).

Per aircraft use of paints, solvents, and abrasive blasting media based on data from NAS Lemoore (Castro, 1997b) and 162 aircraft currently at NAS Lemoore.

Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

TABLE E-52. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2002

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

Emission rates for miscellaneous diesel engines from U.S. Environmental Protection Agency (1995).

Per aircraft use and emission factors for air start units and hydraulic test stands based on data in Castro (1997a).

Calendar year assumptions for aircraft arrivals and flight operations are presented in Table E-33.

Calendar year assumptions for new building construction are presented in Table E-10; construction is assumed to occur the year prior to building use.

#### Data Sources:

Castro, Tim. 1997a. 10-08-97 Fax, Annual Emissions from NAS Lemoore "Huffers" and TSE. Fax sent by Tim Castro, NAS Lemoore.

Castro, Tim. 1997b. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

Hunn, Bruce D. (ed.). 1996. Fundamentals of Building Energy Dynamics.

U.S. Environmental Protection Agency. 1995. Compilation of Air Pollutant Emission Factors. 5th Edition. Volume I: Stationary Point and Area Sources. (AP-42).

U.S. Navy. 1997c. MCAS Miramar Conformity Analysis. Volumes I and II. Southwest Division. San Diego, CA.

WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-53. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEARS 2003, 2004

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR						USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING, FULL FRS	13.21	MILLION GAL/YEAR	0.402	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
AIRCRAFT REFUELING, 4 FLEET	10.70	MILLION GAL/YEAR	0.325	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
NATURAL GAS BOILER, HANGAR	2.76	MILLION SCF/YEAR	0.005	0.112	0.084	0.001	0.017	5% OF RATED 6.3 MILLION BTU/HR CAPACITY	
NATURAL GAS BOILER FOR BEQ, BOQ	3.68	MILLION SCF/YEAR	0.007	0.149	0.112	0.001	0.022	5% OF RATED 4.2 MILLION BTU/HR CAPACITY	
NATURAL GAS USE, OFFICE/INDUSTRIAL	3,139	SCF GAS/YEAR	6E-06	1E-04	1E-04	9E-07	2E-05	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE	
NATURAL GAS USE, ON-BASE HOUSING	9,600	SCF GAS/YEAR	3E-05	5E-04	2E-04	3E-06	5E-05	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF	
NATURAL GAS USE, OFF-BASE HOUSING	22,008	SCF GAS/YEAR	8E-05	1E-03	4E-04	7E-06	1E-04	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF	
ON-BASE SERVICE STATION	605.8	THOUSAND GAL/YEAR	0.515	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE	
AIRCRAFT PAINTING	312.8	GALLONS/YEAR	0.548	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT	
SOLVENT USE	165.6	GALLONS/YEAR	0.609	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT	
ABRASIVE BLASTING	6,192	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.031	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT	
PORTABLE/STATIONARY DIESEL ENGINES	184.0	THOUSAND HP-HRS/YEAR	0.231	2.840	0.615	0.189	0.203	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT	
AIR START UNITS (JP-5)	368	HOURS/YEAR	0.013	0.425	0.447	0.042	0.110	4.0 HOURS/YEAR PER AIRCRAFT	
HYDRAULIC TEST STAND ENGINES (JP-5)	506	HOURS/YEAR	0.033	0.523	0.967	0.004	0.029	5.5 HOURS/YEAR PER AIRCRAFT	

TABLE E-53. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEARS 2003, 2004

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10	
AIRCRAFT REFUELING			0.727	0.000	0.000	0.000	0.000	
ON-BASE PERMIT-EXEMPT SOURCES			0.278	3.787	2.028	0.235	0.341	
ON-BASE NATURAL GAS USE			0.000	0.001	0.000	0.000	0.000	
ON-BASE PERMIT SOURCES			1.685	0.261	0.196	0.002	0.070	
OFF-BASE NATURAL GAS USE			0.000	0.001	0.000	0.000	0.000	

## Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

Aircraft refueling emissions estimated for splash loading processes according to U.S. Environmental Protection Agency (1995). Fuel pit refueling requires only one fuel transfer (underground tank to aircraft). Fuel truck refueling requires two fuel transfers (underground tank to truck, truck to aircraft).

Aircraft refueling estimated to be 80% from fuel pit and 20% from fuel trucks (consistent with hot refueling factor).

Monthly temperature patterns for NAF El Centro from WeatherDisc Associates (1990); see Table E-60.

Natural gas boilers for BEQ facilities assumed to be low-NOx commercial units with typical sizes based on data from Castro (1997b): one 8.4 million BTU/hour boiler for every two BEQs (about 300 spaces each).

Emission estimates for natural gas boilers based on data from U.S. Environmental Protection Agency (1995), assuming operation at 5% of rated capacity (actual NAS Lemoore natural gas use versus boiler capacity, based on data from Castro, 1997b).

Emission estimates for other natural gas use in nonresidential buildings based on low-NOx commercial systems (U.S. Environmental Protection Agency, 1995) and a natural gas requirement of 10 BTU per year per square foot of building space.

Emission estimates for natural gas use in on-base family housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 20 BTU per year per square foot of building space, and 1,200 square feet per family housing unit.

Emission estimates for natural gas use in off-base housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 24 BTU per year per square foot of building space, and 1,400 square feet per family housing unit; 655 off-base units for Phase 1, 1,246 units for Phase 2.

The heating value of natural gas is assumed to be 1,000 BTU per standard cubic foot.

Natural gas requirements for different building types based on building type energy budgets (Hunn, 1996), assuming that natural gas furnishes about 30% of nonresidential building energy and about 50% of residential building energy.

On-base gasoline sales based on NAS Lemoore Navy exchange sales volume (Castro, 1997b) and current military employment at NAS Lemoore.

Emission rate from on-base gasoline sales based on data from NAS Lemoore (Castro, 1997b).

Per aircraft use of paints, solvents, and abrasive blasting media based on data from NAS Lemoore (Castro, 1997b) and 162 aircraft currently at NAS Lemoore.

Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

TABLE E-53. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEARS 2003, 2004

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

Emission rates for miscellaneous diesel engines from U.S. Environmental Protection Agency (1995).

Per aircraft use and emission factors for air start units and hydraulic test stands based on data in Castro (1997a).

Calendar year assumptions for aircraft arrivals and flight operations are presented in Table E-33.

Calendar year assumptions for new building construction are presented in Table E-10; construction is assumed to occur the year prior to building use.

#### Data Sources:

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Castro, Tim. 1997b. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; ITIVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

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WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-54. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2005

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS	
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING, FULL FRS	13.21	MILLION GAL/YEAR	0.402	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
AIRCRAFT REFUELING, 5 FLEET	12.99	MILLION GAL/YEAR	0.395	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
NATURAL GAS BOILER, HANGAR	2.76	MILLION SCF/YEAR	0.005	0.112	0.084	0.001	0.017	5% OF RATED 6.3 MILLION BTU/HR CAPACITY	
NATURAL GAS BOILER FOR BEQ, BOQ	3.68	MILLION SCF/YEAR	0.007	0.149	0.112	0.001	0.022	5% OF RATED 4.2 MILLION BTU/HR CAPACITY	
NATURAL GAS USE, OFFICE/INDUSTRIAL	3.139	SCF GAS/YEAR	6E-06	1E-04	1E-04	9E-07	2E-05	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE	
NATURAL GAS USE, ON-BASE HOUSING	9.600	SCF GAS/YEAR	3E-05	5E-04	2E-04	3E-06	5E-05	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF	
NATURAL GAS USE, OFF-BASE HOUSING	28.986	SCF GAS/YEAR	1E-04	1E-03	6E-04	9E-06	2E-04	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF	
ON-BASE SERVICE STATION	692.2	THOUSAND GAL/YEAR	0.588	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE	
AIRCRAFT PAINTING	353.6	GALLONS/YEAR	0.620	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT	
SOLVENT USE	187.2	GALLONS/YEAR	0.689	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT	
ABRASIVE BLASTING	6.999	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.035	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT	
PORTABLE/STATIONARY DIESEL ENGINES	208.0	THOUSAND HP-HRS/YEAR	0.261	3.210	0.695	0.213	0.229	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT	
AIR START UNITS (JP-5)	416	HOURS/YEAR	0.015	0.480	0.505	0.048	0.124	4.0 HOURS/YEAR PER AIRCRAFT	
HYDRAULIC TEST STAND ENGINES (JP-5)	572	HOURS/YEAR	0.037	0.591	1.093	0.005	0.033	5.5 HOURS/YEAR PER AIRCRAFT	

TABLE E-54. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2005

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS	
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING			0.797	0.000	0.000	0.000	0.000		
ON-BASE PERMIT-EXEMPT SOURCES			0.314	4.281	2.292	0.266	0.386		
ON-BASE NATURAL GAS USE			0.000	0.001	0.000	0.000	0.000		
ON-BASE PERMIT SOURCES			1.909	0.261	0.196	0.002	0.074		
OFF-BASE NATURAL GAS USE			0.000	0.001	0.001	0.000	0.000		

## Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

Aircraft refueling emissions estimated for splash loading processes according to U.S. Environmental Protection Agency (1995). Fuel pit refueling requires only one fuel transfer (underground tank to aircraft). Fuel truck refueling requires two fuel transfers (underground tank to truck, truck to aircraft).

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Emission estimates for other natural gas use in nonresidential buildings based on low-NOx commercial systems (U.S. Environmental Protection Agency, 1995) and a natural gas requirement of 10 BTU per year per square foot of building space.

Emission estimates for natural gas use in on-base family housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 20 BTU per year per square foot of building space, and 1,200 square feet per family housing unit.

Emission estimates for natural gas use in off-base housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 24 BTU per year per square foot of building space, and 1,400 square feet per family housing unit; 655 off-base units for Phase 1, 1,246 units for Phase 2.

The heating value of natural gas is assumed to be 1,000 BTU per standard cubic foot.

Natural gas requirements for different building types based on building type energy budgets (Humm, 1996), assuming that natural gas furnishes about 30% of nonresidential building energy and about 50% of residential building energy.

On-base gasoline sales based on NAS Lemoore Navy exchange sales volume (Castro, 1997b) and current military employment at NAS Lemoore.

Emission rate from on-base gasoline sales based on data from NAS Lemoore (Castro, 1997b).

Per aircraft use of paints, solvents, and abrasive blasting media based on data from NAS Lemoore (Castro, 1997b) and 162 aircraft currently at NAS Lemoore.

Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

TABLE E-54. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2005

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

Emission rates for miscellaneous diesel engines from U.S. Environmental Protection Agency (1995).

Per aircraft use and emission factors for air start units and hydraulic test stands based on data in Castro (1997a).

Calendar year assumptions for aircraft arrivals and flight operations are presented in Table E-33.

Calendar year assumptions for new building construction are presented in Table E-10; construction is assumed to occur the year prior to building use.

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Castro, Tim. 1997b. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

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U.S. Environmental Protection Agency. 1995. Compilation of Air Pollutant Emission Factors. 5th Edition. Volume I: Stationary Point and Area Sources. (AP-42).

U.S. Navy. 1997c. MCAS Miramar Conformity Analysis. Volumes I and II. Southwest Division. San Diego, CA.

WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-55. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2006

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR						USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING, FULL FRS	13.21	MILLION GAL/YEAR	0.402	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
AIRCRAFT REFUELING, 6 FLEET	15.29	MILLION GAL/YEAR	0.465	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
NATURAL GAS BOILER, HANGAR	5.52	MILLION SCF/YEAR	0.011	0.224	0.168	0.002	0.033	5% OF RATED 6.3 MILLION BTU/HR CAPACITY	
NATURAL GAS BOILER FOR BEQ, BOQ	3.68	MILLION SCF/YEAR	0.007	0.149	0.112	0.001	0.022	5% OF RATED 4.2 MILLION BTU/HR CAPACITY	
NATURAL GAS USE, OFFICE/INDUSTRIAL	7.897	SCF GAS/YEAR	2E-05	3E-04	2E-04	2E-06	5E-05	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE	
NATURAL GAS USE, ON-BASE HOUSING	11,400	SCF GAS/YEAR	4E-05	5E-04	2E-04	3E-06	6E-05	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF	
NATURAL GAS USE, OFF-BASE HOUSING	35,963	SCF GAS/YEAR	1E-04	2E-03	7E-04	1E-05	2E-04	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF	
ON-BASE SERVICE STATION	778.5	THOUSAND GAL/YEAR	0.662	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE	
AIRCRAFT PAINTING	394.4	GALLONS/YEAR	0.691	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT	
SOLVENT USE	208.8	GALLONS/YEAR	0.768	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT	
ABRASIVE BLASTING	7,807	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.039	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT	
PORTABLE/STATIONARY DIESEL ENGINES	232.0	THOUSAND HP-HRS/YEAR	0.292	3.580	0.775	0.238	0.256	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT	
AIR START UNITS (JP-5)	464	HOURS/YEAR	0.017	0.536	0.563	0.053	0.138	4.0 HOURS/YEAR PER AIRCRAFT	
HYDRAULIC TEST STAND ENGINES (JP-5)	638	HOURS/YEAR	0.042	0.659	1.219	0.005	0.036	5.5 HOURS/YEAR PER AIRCRAFT	

TABLE E-55. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2006

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10	
AIRCRAFT REFUELING			0.867	0.000	0.000	0.000	0.000	
ON-BASE PERMIT-EXEMPT SOURCES			0.350	4.775	2.557	0.297	0.430	
ON-BASE NATURAL GAS USE			0.000	0.001	0.000	0.000	0.000	
ON-BASE PERMIT SOURCES			2.139	0.373	0.281	0.003	0.094	
OFF-BASE NATURAL GAS USE			0.000	0.002	0.001	0.000	0.000	

## Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

Aircraft refueling emissions estimated for splash loading processes according to U.S. Environmental Protection Agency (1995). Fuel pit refueling requires only one fuel transfer (underground tank to aircraft). Fuel truck refueling requires two fuel transfers (underground tank to truck, truck to aircraft).

Aircraft refueling estimated to be 80% from fuel pit and 20% from fuel trucks (consistent with hot refueling factor).

Monthly temperature patterns for NAF El Centro from WeatherDisc Associates (1990); see Table E-60.

Natural gas boilers for BEQ facilities assumed to be low-NOx commercial units with typical sizes based on data from Castro (1997b): one 8.4 million BTU/hour boiler for every two BEQs (about 300 spaces each).

Emission estimates for natural gas boilers based on data from U.S. Environmental Protection Agency (1995), assuming operation at 5% of rated capacity (actual NAS Lemoore natural gas use versus boiler capacity, based on data from Castro, 1997b).

Emission estimates for other natural gas use in nonresidential buildings based on low-NOx commercial systems (U.S. Environmental Protection Agency, 1995) and a natural gas requirement of 10 BTU per year per square foot of building space.

Emission estimates for natural gas use in on-base family housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 20 BTU per year per square foot of building space, and 1,200 square feet per family housing unit.

Emission estimates for natural gas use in off-base housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 24 BTU per year per square foot of building space, and 1,400 square feet per family housing unit; 655 off-base units for Phase 1, 1,246 units for Phase 2.

The heating value of natural gas is assumed to be 1,000 BTU per standard cubic foot.

Natural gas requirements for different building types based on building type energy budgets (Hunn, 1996), assuming that natural gas furnishes about 30% of nonresidential building energy and about 50% of residential building energy.

On-base gasoline sales based on NAS Lemoore Navy exchange sales volume (Castro, 1997b) and current military employment at NAS Lemoore.

Emission rate from on-base gasoline sales based on data from NAS Lemoore (Castro, 1997b).

Per aircraft use of paints, solvents, and abrasive blasting media based on data from NAS Lemoore (Castro, 1997b) and 162 aircraft currently at NAS Lemoore.

Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

TABLE E-55. MISCELLANEOUS EMISSION SOURCES, MAF EL CENTRO ALTERNATIVE, YEAR 2006

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

Emission rates for miscellaneous diesel engines from U.S. Environmental Protection Agency (1995).

Per aircraft use and emission factors for air start units and hydraulic test stands based on data in Castro (1997a).

Calendar year assumptions for aircraft arrivals and flight operations are presented in Table E-33.

Calendar year assumptions for new building construction are presented in Table E-10; construction is assumed to occur the year prior to building use.

#### Data Sources:

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Hunn, Bruce D. (ed.). 1996. Fundamentals of Building Energy Dynamics.

U.S. Environmental Protection Agency. 1995. Compilation of Air Pollutant Emission Factors. 5th Edition. Volume I: Stationary Point and Area Sources. (AP-42).

U.S. Navy. 1997c. MCAS Miramar Conformity Analysis. Volumes I and II. Southwest Division. San Diego, CA.

WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-56. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2007

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR							USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10			
AIRCRAFT REFUELING, FULL FRS	13.21	MILLION GAL/YEAR	0.402	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING		
AIRCRAFT REFUELING, 7 FLEET	17.58	MILLION GAL/YEAR	0.535	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING		
NATURAL GAS BOILER, HANGAR	5.52	MILLION SCF/YEAR	0.011	0.224	0.168	0.002	0.033	5% OF RATED 6.3 MILLION BTU/HR CAPACITY		
NATURAL GAS BOILER FOR BEQ, BOQ	5.52	MILLION SCF/YEAR	0.011	0.224	0.168	0.002	0.033	5% OF RATED 4.2 MILLION BTU/HR CAPACITY		
NATURAL GAS USE, OFFICE/INDUSTRIAL	12,381	SCF GAS/YEAR	2E-05	5E-04	4E-04	4E-06	7E-05	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE		
NATURAL GAS USE, ON-BASE HOUSING	13,200	SCF GAS/YEAR	5E-05	6E-04	3E-04	4E-06	7E-05	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF		
NATURAL GAS USE, OFF-BASE HOUSING	42,941	SCF GAS/YEAR	2E-04	2E-03	9E-04	1E-05	2E-04	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF		
ON-BASE SERVICE STATION	864.8	THOUSAND GAL/YEAR	0.735	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE		
AIRCRAFT PAINTING	435.2	GALLONS/YEAR	0.763	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT		
SOLVENT USE	230.4	GALLONS/YEAR	0.848	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT		
ABRASIVE BLASTING	8,614	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.043	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT		
PORTABLE/STATIONARY DIESEL ENGINES	256.0	THOUSAND HP-HRS/YEAR	0.322	3.951	0.855	0.263	0.282	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT		
AIR START UNITS (JP-5)	512	HOURS/YEAR	0.019	0.591	0.621	0.059	0.153	4.0 HOURS/YEAR PER AIRCRAFT		
HYDRAULIC TEST STAND ENGINES (JP-5)	704	HOURS/YEAR	0.046	0.727	1.345	0.006	0.040	5.5 HOURS/YEAR PER AIRCRAFT		

TABLE E-56. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2007

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS	
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING			0.936	0.000	0.000	0.000	0.000		
ON-BASE PERMIT-EXEMPT SOURCES			0.386	5.269	2.821	0.328	0.475		
ON-BASE NATURAL GAS USE			0.000	0.001	0.001	0.000	0.000		
ON-BASE PERMIT SOURCES			2.367	0.447	0.337	0.003	0.109		
OFF-BASE NATURAL GAS USE			0.000	0.002	0.001	0.000	0.000		

## Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

Aircraft refueling emissions estimated for splash loading processes according to U.S. Environmental Protection Agency (1995). Fuel pit refueling requires only one fuel transfer (underground tank to aircraft). Fuel truck refueling requires two fuel transfers (underground tank to truck, truck to aircraft).

Aircraft refueling estimated to be 80% from fuel pit and 20% from fuel trucks (consistent with hot refueling factor).

Monthly temperature patterns for NAF El Centro from WeatherDisc Associates (1990); see Table E-60.

Natural gas boilers for BEQ facilities assumed to be low-NOx commercial units with typical sizes based on data from Castro (1997b): one 8.4 million BTU/hour boiler for every two BEQs (about 300 spaces each).

Emission estimates for natural gas boilers based on data from U.S. Environmental Protection Agency (1995), assuming operation at 5% of rated capacity (actual NAS Lemoore natural gas use versus boiler capacity, based on data from Castro, 1997b).

Emission estimates for other natural gas use in nonresidential buildings based on low-NOx commercial systems (U.S. Environmental Protection Agency, 1995) and a natural gas requirement of 10 BTU per year per square foot of building space.

Emission estimates for natural gas use in on-base family housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 20 BTU per year per square foot of building space, and 1,200 square feet per family housing unit.

Emission estimates for natural gas use in off-base housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 24 BTU per year per square foot of building space, and 1,400 square feet per family housing unit; 655 off-base units for Phase 1, 1,246 units for Phase 2.

The heating value of natural gas is assumed to be 1,000 BTU per standard cubic foot.

Natural gas requirements for different building types based on building type energy budgets (Humm, 1996), assuming that natural gas furnishes about 30% of nonresidential building energy and about 50% of residential building energy.

On-base gasoline sales based on NAS Lemoore Navy exchange sales volume (Castro, 1997b) and current military employment at NAS Lemoore.

Emission rate from on-base gasoline sales based on data from NAS Lemoore (Castro, 1997b).

Per aircraft use of paints, solvents, and abrasive blasting media based on data from NAS Lemoore (Castro, 1997b) and 162 aircraft currently at NAS Lemoore.

Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

TABLE E-56. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2007

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

Emission rates for miscellaneous diesel engines from U.S. Environmental Protection Agency (1995).

Per aircraft use and emission factors for air start units and hydraulic test stands based on data in Castro (1997a).

Calendar year assumptions for aircraft arrivals and flight operations are presented in Table E-33.

Calendar year assumptions for new building construction are presented in Table E-10; construction is assumed to occur the year prior to building use.

#### Data Sources:

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U.S. Environmental Protection Agency. 1995. Compilation of Air Pollutant Emission Factors. 5th Edition. Volume I: Stationary Point and Area Sources. (AP-42).

U.S. Navy. 1997c. MCAS Miramar Conformity Analysis. Volumes I and II. Southwest Division. San Diego, CA.

WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-57. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2008

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR						USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING, FULL FRS	13.21	MILLION GAL/YEAR	0.402	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
AIRCRAFT REFUELING, 8 FLEET	19.87	MILLION GAL/YEAR	0.604	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
NATURAL GAS BOILER, HANGAR	5.52	MILLION SCF/YEAR	0.011	0.224	0.168	0.002	0.033	5% OF RATED 6.3 MILLION BTU/HR CAPACITY	
NATURAL GAS BOILER FOR BEQ, BOQ	7.36	MILLION SCF/YEAR	0.014	0.298	0.224	0.002	0.044	5% OF RATED 4.2 MILLION BTU/HR CAPACITY	
NATURAL GAS USE, OFFICE/INDUSTRIAL	32,690	SCF GAS/YEAR	6E-05	1E-03	1E-03	1E-05	2E-04	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE	
NATURAL GAS USE, ON-BASE HOUSING	15,000	SCF GAS/YEAR	5E-05	7E-04	3E-04	5E-06	8E-05	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF	
NATURAL GAS USE, OFF-BASE HOUSING	49,918	SCF GAS/YEAR	2E-04	2E-03	1E-03	1E-05	3E-04	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF	
ON-BASE SERVICE STATION	951.2	THOUSAND GAL/YEAR	0.809	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE	
AIRCRAFT PAINTING	476.0	GALLONS/YEAR	0.834	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT	
SOLVENT USE	252.0	GALLONS/YEAR	0.927	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT	
ABRASIVE BLASTING	9,422	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.047	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT	
PORTABLE/STATIONARY DIESEL ENGINES	280.0	THOUSAND HP-HRS/YEAR	0.352	4.321	0.935	0.287	0.309	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT	
AIR START UNITS (JP-5)	560	HOURS/YEAR	0.020	0.647	0.679	0.064	0.167	4.0 HOURS/YEAR PER AIRCRAFT	
HYDRAULIC TEST STAND ENGINES (JP-5)	770	HOURS/YEAR	0.050	0.795	1.471	0.007	0.044	5.5 HOURS/YEAR PER AIRCRAFT	

TABLE E-57. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2008

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS	
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING			1.006	0.000	0.000	0.000	0.000		
ON-BASE PERMIT-EXEMPT SOURCES			0.423	5.763	3.086	0.358	0.519		
ON-BASE NATURAL GAS USE			0.000	0.002	0.001	0.000	0.000		
ON-BASE PERMIT SOURCES			2.595	0.522	0.393	0.004	0.124		
OFF-BASE NATURAL GAS USE			0.000	0.002	0.001	0.000	0.000		

## Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

Aircraft refueling emissions estimated for splash loading processes according to U.S. Environmental Protection Agency (1995). Fuel pit refueling requires only one fuel transfer (underground tank to aircraft). Fuel truck refueling requires two fuel transfers (underground tank to truck, truck to aircraft).

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Emission estimates for other natural gas use in nonresidential buildings based on low-NOx commercial systems (U.S. Environmental Protection Agency, 1995) and a natural gas requirement of 10 BTU per year per square foot of building space.

Emission estimates for natural gas use in on-base family housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 20 BTU per year per square foot of building space, and 1,200 square feet per family housing unit.

Emission estimates for natural gas use in off-base housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 24 BTU per year per square foot of building space, and 1,400 square feet per family housing unit; 655 off-base units for Phase 1, 1,246 units for Phase 2.

The heating value of natural gas is assumed to be 1,000 BTU per standard cubic foot.

Natural gas requirements for different building types based on building type energy budgets (Hunn, 1996), assuming that natural gas furnishes about 30% of nonresidential building energy and about 50% of residential building energy.

On-base gasoline sales based on NAS Lemoore Navy exchange sales volume (Castro, 1997b) and current military employment at NAS Lemoore.

Emission rate from on-base gasoline sales based on data from NAS Lemoore (Castro, 1997b).

Per aircraft use of paints, solvents, and abrasive blasting media based on data from NAS Lemoore (Castro, 1997b) and 162 aircraft currently at NAS Lemoore.

Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

TABLE E-57. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2008

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

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Per aircraft use and emission factors for air start units and hydraulic test stands based on data in Castro (1997a).

Calendar year assumptions for aircraft arrivals and flight operations are presented in Table E-33.

Calendar year assumptions for new building construction are presented in Table E-10; construction is assumed to occur the year prior to building use.

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WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-58. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2009

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR						USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING, FULL FRS	13.21	MILLION GAL/YEAR	0.402	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
AIRCRAFT REFUELING, 9 FLEET	22.16	MILLION GAL/YEAR	0.674	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING	
NATURAL GAS BOILER, HANGAR	5.52	MILLION SCF/YEAR	0.011	0.224	0.168	0.002	0.033	5% OF RATED 6.3 MILLION BTU/HR CAPACITY	
NATURAL GAS BOILER FOR BEQ, BOQ	7.36	MILLION SCF/YEAR	0.014	0.298	0.224	0.002	0.044	5% OF RATED 4.2 MILLION BTU/HR CAPACITY	
NATURAL GAS USE, OFFICE/INDUSTRIAL	32,881	SCF GAS/YEAR	6E-05	1E-03	1E-03	1E-05	2E-04	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE	
NATURAL GAS USE, ON-BASE HOUSING	16,800	SCF GAS/YEAR	6E-05	8E-04	3E-04	5E-06	9E-05	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF	
NATURAL GAS USE, OFF-BASE HOUSING	56,896	SCF GAS/YEAR	2E-04	3E-03	1E-03	2E-05	3E-04	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF	
ON-BASE SERVICE STATION	1,037.5	THOUSAND GAL/YEAR	0.882	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE	
AIRCRAFT PAINTING	516.8	GALLONS/YEAR	0.906	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT	
SOLVENT USE	273.6	GALLONS/YEAR	1.007	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT	
ABRASIVE BLASTING	10,230	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.051	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT	
PORTABLE/STATIONARY DIESEL ENGINES	304.0	THOUSAND HP-HRS/YEAR	0.382	4.691	1.015	0.312	0.335	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT	
AIR START UNITS (JP-5)	608	HOURS/YEAR	0.022	0.702	0.738	0.070	0.181	4.0 HOURS/YEAR PER AIRCRAFT	
HYDRAULIC TEST STAND ENGINES (JP-5)	836	HOURS/YEAR	0.055	0.864	1.597	0.007	0.048	5.5 HOURS/YEAR PER AIRCRAFT	

TABLE E-58. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2009

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS	
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10		
AIRCRAFT REFUELING			1.076	0.000	0.000	0.000	0.000		
ON-BASE PERMIT-EXEMPT SOURCES			0.459	6.257	3.350	0.389	0.564		
ON-BASE NATURAL GAS USE			0.000	0.002	0.001	0.000	0.000		
ON-BASE PERMIT SOURCES			2.819	0.522	0.393	0.004	0.128		
OFF-BASE NATURAL GAS USE			0.000	0.003	0.001	0.000	0.000		

## Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

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Emission rate from on-base gasoline sales based on data from NAS Lemoore (Castro, 1997b).

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Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

TABLE E-58. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2009

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

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WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-59. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2010

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR							USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10			
AIRCRAFT REFUELING, FULL FRS	13.21	MILLION GAL/YEAR	0.402	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING		
AIRCRAFT REFUELING, 10 FLEET	24.46	MILLION GAL/YEAR	0.744	0.000	0.000	0.000	0.000	80% FUEL PIT, 20% TRUCK REFUELING		
NATURAL GAS BOILER, HANGAR	5.52	MILLION SCF/YEAR	0.011	0.224	0.168	0.002	0.033	5% OF RATED 6.3 MILLION BTU/HR CAPACITY		
NATURAL GAS BOILER FOR BEQ, BOQ	7.36	MILLION SCF/YEAR	0.014	0.298	0.224	0.002	0.044	5% OF RATED 4.2 MILLION BTU/HR CAPACITY		
NATURAL GAS USE, OFFICE/INDUSTRIAL	32,881	SCF GAS/YEAR	6E-05	1E-03	1E-03	1E-05	2E-04	10 BTU/YR/SF, 1000 BTU/SCF HEAT VALUE		
NATURAL GAS USE, ON-BASE HOUSING	18,600	SCF GAS/YEAR	7E-05	9E-04	4E-04	6E-06	1E-04	20 BTU/YR/SF, 1200 SF/DU, 1000 BTU/SCF		
NATURAL GAS USE, OFF-BASE HOUSING	63,874	SCF GAS/YEAR	2E-04	3E-03	1E-03	2E-05	4E-04	24 BTU/YR/SF, 1400 SF/DU, 1000 BTU/SCF		
ON-BASE SERVICE STATION	1,123.9	THOUSAND GAL/YEAR	0.955	0.000	0.000	0.000	0.000	326.42 GAL/YEAR PER MILITARY EMPLOYEE		
AIRCRAFT PAINTING	557.6	GALLONS/YEAR	0.977	0.000	0.000	0.000	0.000	3.4 GALLONS/YEAR PER ADDED AIRCRAFT		
SOLVENT USE	295.2	GALLONS/YEAR	1.086	0.000	0.000	0.000	0.000	1.8 GALLONS/YEAR PER ADDED AIRCRAFT		
ABRASIVE BLASTING	11,037	POUNDS/YEAR	0.000	0.000	0.000	0.000	0.055	67.3 POUNDS PER YEAR PER ADDED AIRCRAFT		
PORTABLE/STATIONARY DIESEL ENGINES	328.0	THOUSAND HP-HRS/YEAR	0.412	5.062	1.096	0.337	0.362	50 HP LOAD, 40 HRS/YEAR PER AIRCRAFT		
AIR START UNITS (JP-5)	656	HOURS/YEAR	0.024	0.758	0.796	0.075	0.195	4.0 HOURS/YEAR PER AIRCRAFT		
HYDRAULIC TEST STAND ENGINES (JP-5)	902	HOURS/YEAR	0.059	0.932	1.723	0.008	0.051	5.5 HOURS/YEAR PER AIRCRAFT		

TABLE E-59. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2010

SOURCE CATEGORY	USE INDEX		ANNUAL EMISSIONS, TONS/YEAR					USE RATE ASSUMPTIONS
	AMOUNT	UNITS	ROG	NOx	CO	SOx	PM10	
AIRCRAFT REFUELING			1.146	0.000	0.000	0.000	0.000	
ON-BASE PERMIT-EXEMPT SOURCES			0.495	6.751	3.615	0.420	0.608	
ON-BASE NATURAL GAS USE			0.000	0.002	0.001	0.000	0.000	
ON-BASE PERMIT SOURCES			3.043	0.522	0.393	0.004	0.132	
OFF-BASE NATURAL GAS USE			0.000	0.003	0.001	0.000	0.000	

## Notes:

FRS squadron fuel requirements estimated at 11,009,160 gallons per year and fleet squadron fuel requirements estimated as 2,229,220 gallons per squadron per year, based on information provided by E/F FIT team personnel at NAS Lemoore.

Aircraft refueling emissions estimated for splash loading processes according to U.S. Environmental Protection Agency (1995). Fuel pit refueling requires only one fuel transfer (underground tank to aircraft). Fuel truck refueling requires two fuel transfers (underground tank to truck, truck to aircraft).

Aircraft refueling estimated to be 80% from fuel pit and 20% from fuel trucks (consistent with hot refueling factor).

Monthly temperature patterns for NAF El Centro from WeatherDisc Associates (1990); see Table E-60.

Natural gas boilers for BEQ facilities assumed to be low-NOx commercial units with typical sizes based on data from Castro (1997b): one 8.4 million BTU/hour boiler for every two BEQs (about 300 spaces each).

Emission estimates for natural gas boilers based on data from U.S. Environmental Protection Agency (1995), assuming operation at 5% of rated capacity (actual NAS Lemoore natural gas use versus boiler capacity, based on data from Castro, 1997b).

Emission estimates for other natural gas use in nonresidential buildings based on low-NOx commercial systems (U.S. Environmental Protection Agency, 1995) and a natural gas requirement of 10 BTU per year per square foot of building space.

Emission estimates for natural gas use in on-base family housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 20 BTU per year per square foot of building space, and 1,200 square feet per family housing unit.

Emission estimates for natural gas use in off-base housing based on residential systems (U.S. Environmental Protection Agency, 1995), a natural gas requirement of 24 BTU per year per square foot of building space, and 1,400 square feet per family housing unit; 655 off-base units for Phase 1, 1,246 units for Phase 2.

The heating value of natural gas is assumed to be 1,000 BTU per standard cubic foot.

Natural gas requirements for different building types based on building type energy budgets (Hunn, 1996), assuming that natural gas furnishes about 30% of nonresidential building energy and about 50% of residential building energy.

On-base gasoline sales based on NAS Lemoore Navy exchange sales volume (Castro, 1997b) and current military employment at NAS Lemoore.

Emission rate from on-base gasoline sales based on data from NAS Lemoore (Castro, 1997b).

Per aircraft use of paints, solvents, and abrasive blasting media based on data from NAS Lemoore (Castro, 1997b) and 162 aircraft currently at NAS Lemoore.

Emissions from aircraft painting operations assumes volatile organic content of 420 grams per liter.

TABLE E-59. MISCELLANEOUS EMISSION SOURCES, NAF EL CENTRO ALTERNATIVE, YEAR 2010

Emissions from solvent use assumes 100% volatile organic compound content.

Emissions from abrasive blasting activities based on emission rate in Castro (1997b).

Miscellaneous diesel engine emissions based on a generalized use assumption (about 4 times the combined use of air start units and hydraulic test stands) and a typical in-use load of 50 horsepower.

Emission rates for miscellaneous diesel engines from U.S. Environmental Protection Agency (1995).

Per aircraft use and emission factors for air start units and hydraulic test stands based on data in Castro (1997a).

Calendar year assumptions for aircraft arrivals and flight operations are presented in Table E-33.

Calendar year assumptions for new building construction are presented in Table E-10; construction is assumed to occur the year prior to building use.

#### Data Sources:

Castro, Tim. 1997a. 10-08-97 Fax, Annual Emissions from NAS Lemoore "Huffers" and TSE. Fax sent by Tim Castro, NAS Lemoore.

Castro, Tim. 1997b. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.

Hunn, Bruce D. (ed.). 1996. Fundamentals of Building Energy Dynamics.

U.S. Environmental Protection Agency. 1995. Compilation of Air Pollutant Emission Factors. 5th Edition. Volume I: Stationary Point and Area Sources. (AP-42).

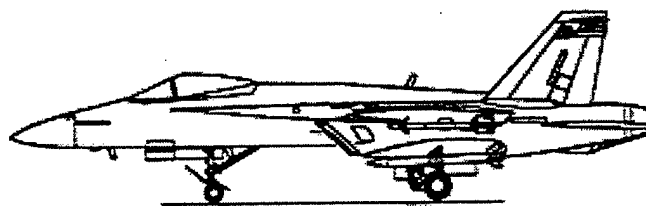
U.S. Navy. 1997c. MCAS Miramar Conformity Analysis. Volumes I and II. Southwest Division. San Diego, CA.

WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.

TABLE E-60. MONTHLY TEMPERATURE PATTERNS USED TO ESTIMATE JET FUEL VOLATILITY

LOCATION	PARAMETER	MONTHLY MEAN AIR TEMPERATURE VALUES, DEGREES FAHRENHEIT												
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC ANNUAL	
NAS LEMOORE	MEAN MAX	54	61	67	75	83	90	99	97	91	80	65	55	76
	MEAN MIN	34	39	40	46	51	56	63	61	57	50	40	37	48
	MIDPOINT	44	50	53.5	60.5	67	73	81	79	74	65	52.5	46	62
TEMP FOR JP-5 VOLATILITY:		40	50	50	60	70	70	80	80	70	70	50	50	
NAF EL CENTRO	MEAN MAX	68	73	77	86	93	101	107	106	103	91	78	70	88
	MEAN MIN	43	47	51	58	64	71	79	78	74	63	50	44	60
	MIDPOINT	55.5	60	64	72	78.5	86	93	92	88.5	77	64	57	74
TEMP FOR JP-5 VOLATILITY:		60	60	60	70	80	90	90	90	90	80	60	60	

Data Source:  
WeatherDisc Associates. 1990. Worldwide Airfield Summaries (TD-9647). World WeatherDisc Version 2.1. CD-ROM.



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## VEHICLE USE PARAMETERS, ON-BASE HOUSING

TABLE E-61. VEHICLE TRAVEL TIME PATTERNS AND OPERATING MODES FOR ON-BASE HOUSING

DISTRIBUTION OF TRAVEL BY TRIP DURATION INTERVALS												
TRIP TYPE	PORTION OF TOTAL TRIPS	UNDER 8 MINUTES	8 - 10 MINUTES	10 - 15 MINUTES	15 - 20 MINUTES	20 - 25 MINUTES	25 - 30 MINUTES	30 - 35 MINUTES	35 - 40 MINUTES	40 - 45 MINUTES	45 - 50 MINUTES	OVER 50 MINUTES
H-W	35.00%	45.00%	30.00%	20.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
H-S	40.00%	50.00%	20.00%	15.00%	5.00%	3.00%	2.00%	1.00%	1.00%	1.00%	1.00%	1.00%
H-O	25.00%	20.00%	15.00%	25.00%	15.00%	10.00%	7.00%	3.00%	2.00%	1.00%	1.00%	1.00%
SUM/MEAN	100.00%	40.75%	22.25%	19.25%	5.75%	3.70%	2.55%	1.15%	0.90%	0.65%	0.65%	0.65%

## CUMULATIVE TRIP OPERATING MODES (FOR TOTAL EMISSIONS ANALYSES):

TRIP TYPE	MEAN TRAVEL TIME (MINUTES)	MEAN COLD START MODE	MEAN HOT START MODE	MEAN HOT STABLE MODE	NONCAT COLD START MODE	NONCAT HOT START MODE	CATALYST COLD START MODE	CATALYST HOT START MODE
H-W	7.68	84.65%	7.22%	8.13%	73.54%	18.34%	85.10%	6.77%
H-S	10.78	43.90%	40.30%	15.81%	28.30%	55.90%	44.53%	39.66%
H-O	15.65	44.46%	21.53%	34.01%	28.63%	37.36%	45.11%	20.89%
MEANS	10.91	58.30%	24.03%	17.67%	44.21%	38.12%	58.87%	23.46%

TABLE E-62. EMFAC7F INPUT ASSUMPTIONS, NAS LEMOORE ON-BASE HOUSING

## SUMMARY OF INPUT ASSUMPTIONS:

CALENDAR YEAR: 1999

I&amp;M PROGRAM: YES

## VEHICLE MIX ASSUMPTIONS:

LDA	LDT	MDT	HDG	HDD	BUS	MCY
70.94%	25.50%	2.52%	0.00%	0.00%	0.00%	1.04%

AIR TEMPERATURE FOR EXHAUST RATES, SUMMER: 85 WINTER: 40

## EVAPORATIVE EMISSIONS TEMPERATURE PATTERNS:

	MINIMUM	8 AM	9 AM	11 AM	1 PM	MAXIMUM
SUMMER	60	64	70	86	94	100
WINTER	35	35	37	43	49	50

## OPERATING MODE ASSUMPTIONS BY TRIP TYPE:

	COLD START	HOT START	HOT STABLE	3-CATEGORY MIX BASIS:		
				WORK	SHOP	OTHER
H-W	84.65%	7.22%	8.13%	100.0%	0.0%	0.0%
H-S	43.90%	40.30%	15.80%	0.0%	100.0%	0.0%
H-O	44.46%	21.53%	34.01%	0.0%	0.0%	100.0%
O-W	39.94%	24.70%	35.36%	0.0%	0.0%	0.0%
O-O	22.55%	57.72%	19.73%	0.0%	0.0%	0.0%
WORK	84.65%	7.22%	8.13%			
SHOP	43.90%	40.30%	15.80%			
OTHER	44.46%	21.53%	34.01%			

NOTES: LDA = light duty autos  
 LDT = light duty trucks  
 MDT = medium duty trucks  
 HDG = heavy duty gasoline-fueled vehicles  
 HDD = heavy duty diesel-fueled vehicles  
 BUS = diesel-fueled urban buses  
 MCY = motorcycles  
 H-W = home-work trips  
 H-S = home-shopping trips  
 H-O = home-other trips  
 O-W = other-work trips  
 O-O = other-other trips  
 WORK = combined home-work and other-work trips  
 SHOP = home-shopping trips  
 OTHER = combined home-other and other-other trips

TABLE E-63. 1999 EMISSION RATES, NAS LEMOORE ON-BASE HOUSING

POL- LUTANT	TRIP PURPOSE	GRAM/MILE RATES BY SPEED IN MPH				
		15	25	35	45	55
ROG	WORK	1.88	1.31	1.15	1.06	1.09
	SHOP	1.59	1.02	0.85	0.76	0.79
	OTHER	1.56	0.99	0.82	0.73	0.76
NOx	WORK	1.25	1.08	1.07	1.19	1.48
	SHOP	1.10	0.93	0.92	1.04	1.33
	OTHER	1.04	0.87	0.86	0.98	1.26
CO-S	WORK	14.84	12.65	11.67	11.21	11.74
	SHOP	11.77	9.58	8.59	8.14	8.67
	OTHER	11.28	9.09	8.11	7.65	8.18
CO-W	WORK	32.88	30.27	29.09	28.54	29.16
	SHOP	20.98	18.37	17.19	16.63	17.26
	OTHER	20.98	18.37	17.19	16.64	17.26
PMEX	WORK	0.01	0.01	0.01	0.01	0.01
	SHOP	0.01	0.01	0.01	0.01	0.01
	OTHER	0.01	0.01	0.01	0.01	0.01
PMTW	WORK	0.20	0.20	0.20	0.20	0.20
	SHOP	0.20	0.20	0.20	0.20	0.20
	OTHER	0.20	0.20	0.20	0.20	0.20
soak drnl/rstl						
	WORK	0.50	6.43			
	SHOP	0.50	6.43			
	OTHER	0.50	6.43			

TABLE E-64. EMFAC7F INPUT ASSUMPTIONS, NAF EL CENTRO ON-BASE HOUSING

## SUMMARY OF INPUT ASSUMPTIONS:

CALENDAR YEAR: 1999 I&M PROGRAM: YES

## VEHICLE MIX ASSUMPTIONS:

LDA	LDT	MDT	HDG	HDD	BUS	MCY
70.94%	25.50%	2.52%	0.00%	0.00%	0.00%	1.04%

AIR TEMPERATURE FOR EXHAUST RATES, SUMMER: 90 WINTER: 60

## EVAPORATIVE EMISSIONS TEMPERATURE PATTERNS:

	MINIMUM	8 AM	9 AM	11 AM	1 PM	MAXIMUM
SUMMER	78	81	85	96	101	105
WINTER	45	45	48	59	68	70

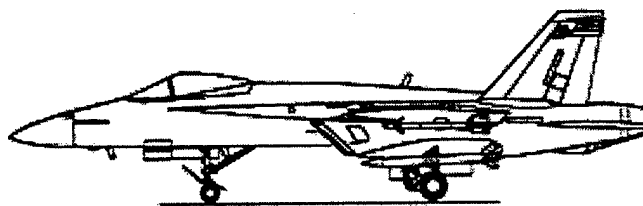
## OPERATING MODE ASSUMPTIONS BY TRIP TYPE:

	COLD START	HOT START	HOT STABLE	3-CATEGORY MIX BASIS:		
				WORK	SHOP	OTHER
H-W	84.65%	7.22%	8.13%	100.0%	0.0%	0.0%
H-S	43.90%	40.30%	15.80%	0.0%	100.0%	0.0%
H-O	44.46%	21.53%	34.01%	0.0%	0.0%	100.0%
O-W	39.94%	24.70%	35.36%	0.0%	0.0%	0.0%
O-O	22.55%	57.72%	19.73%	0.0%	0.0%	0.0%
WORK	84.65%	7.22%	8.13%			
SHOP	43.90%	40.30%	15.80%			
OTHER	44.46%	21.53%	34.01%			

NOTES: LDA = light duty autos  
 LDT = light duty trucks  
 MDT = medium duty trucks  
 HDG = heavy duty gasoline-fueled vehicles  
 HDD = heavy duty diesel-fueled vehicles  
 BUS = diesel-fueled urban buses  
 MCY = motorcycles  
 H-W = home-work trips  
 H-S = home-shopping trips  
 H-O = home-other trips  
 O-W = other-work trips  
 O-O = other-other trips  
 WORK = combined home-work and other-work trips  
 SHOP = home-shopping trips  
 OTHER = combined home-other and other-other trips

TABLE E-65. 1999 EMISSION RATES, NAF EL CENTRO ON-BASE HOUSING

POL- LUTANT	TRIP PURPOSE	GRAM/MILE RATES BY SPEED IN MPH				
		15	25	35	45	55
ROG	WORK	1.99	1.33	1.14	1.05	1.08
	SHOP	1.72	1.05	0.87	0.77	0.81
	OTHER	1.68	1.02	0.84	0.74	0.78
NOx	WORK	1.25	1.08	1.07	1.19	1.48
	SHOP	1.10	0.93	0.92	1.05	1.34
	OTHER	1.04	0.87	0.86	0.98	1.27
CO-S	WORK	15.16	12.83	11.79	11.30	11.87
	SHOP	12.26	9.93	8.88	8.40	8.96
	OTHER	11.70	9.37	8.33	7.84	8.41
CO-W	WORK	22.46	20.25	19.25	18.79	19.30
	SHOP	15.01	12.80	11.81	11.34	11.85
	OTHER	14.95	12.74	11.74	11.28	11.79
PMEX	WORK	0.01	0.01	0.01	0.01	0.01
	SHOP	0.01	0.01	0.01	0.01	0.01
	OTHER	0.01	0.01	0.01	0.01	0.01
PMTW	WORK	0.20	0.20	0.20	0.20	0.20
	SHOP	0.20	0.20	0.20	0.20	0.20
	OTHER	0.20	0.20	0.20	0.20	0.20
soak drnl/rstl						
	WORK	0.50	8.11			
	SHOP	0.50	8.11			
	OTHER	0.50	8.11			



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## VEHICLE USE PARAMETERS, OFF-BASE HOUSING

TABLE E-66. VEHICLE TRAVEL TIME PATTERNS AND OPERATING MODES, OFF-BASE HOUSING AT NAS LEMOORE

DISTRIBUTION OF TRAVEL BY TRIP DURATION INTERVALS												
TRIP TYPE	PORTION OF TOTAL TRIPS	UNDER 8 MINUTES	8 - 10 MINUTES	10 - 15 MINUTES	15 - 20 MINUTES	20 - 25 MINUTES	25 - 30 MINUTES	30 - 35 MINUTES	35 - 40 MINUTES	40 - 45 MINUTES	45 - 50 MINUTES	OVER 50 MINUTES
H-W	35.00%	15.00%	25.00%	17.00%	12.00%	15.00%	10.00%	1.00%	1.00%	2.00%	1.00%	1.00%
H-S	40.00%	45.00%	20.00%	13.00%	5.00%	10.00%	2.00%	1.00%	1.00%	1.00%	1.00%	1.00%
H-O	25.00%	20.00%	18.00%	25.00%	10.00%	15.00%	5.00%	1.00%	1.00%	3.00%	1.00%	1.00%
SUM/MEAN	100.00%	28.25%	21.25%	17.40%	8.70%	13.00%	5.55%	1.00%	1.00%	1.85%	1.00%	1.00%

## CUMULATIVE TRIP OPERATING MODES (FOR TOTAL EMISSIONS ANALYSES):

TRIP TYPE	MEAN TRAVEL TIME (MINUTES)	MEAN COLD START MODE	MEAN HOT START MODE	MEAN HOT STABLE MODE	NONCAT COLD START MODE	NONCAT HOT START MODE	CATALYST COLD START MODE	CATALYST HOT START MODE
H-W	16.10	60.64%	5.17%	34.19%	52.68%	13.14%	60.96%	4.85%
H-S	11.83	41.95%	38.51%	19.53%	27.04%	53.42%	42.56%	37.91%
H-O	15.45	45.36%	21.96%	32.68%	29.20%	38.12%	46.02%	21.31%
MEANS	14.23	49.34%	22.71%	27.95%	36.56%	35.50%	49.86%	22.19%

TABLE E-67. VEHICLE TRAVEL TIME PATTERNS AND OPERATING MODES, OFF-BASE HOUSING AT NAF EL CENTRO

DISTRIBUTION OF TRAVEL BY TRIP DURATION INTERVALS												
TRIP TYPE	PORTION OF TOTAL TRIPS	UNDER 8 MINUTES	8 - 10 MINUTES	10 - 15 MINUTES	15 - 20 MINUTES	20 - 25 MINUTES	25 - 30 MINUTES	30 - 35 MINUTES	35 - 40 MINUTES	40 - 45 MINUTES	45 - 50 MINUTES	OVER 50 MINUTES
H-W	35.00%	20.00%	25.00%	20.00%	10.00%	10.00%	2.00%	2.00%	4.00%	3.00%	2.00%	2.00%
H-S	40.00%	40.00%	20.00%	15.00%	10.00%	5.00%	2.00%	1.00%	2.00%	2.00%	2.00%	1.00%
H-O	25.00%	20.00%	15.00%	25.00%	10.00%	10.00%	3.00%	5.00%	5.00%	3.00%	2.00%	2.00%
SUM/MEAN	100.00%	28.00%	20.50%	19.25%	10.00%	8.00%	2.25%	2.35%	3.45%	2.60%	2.00%	1.60%

## CUMULATIVE TRIP OPERATING MODES (FOR TOTAL EMISSIONS ANALYSES):

TRIP TYPE	MEAN TRAVEL TIME (MINUTES)	MEAN COLD START MODE	MEAN HOT START MODE	MEAN HOT STABLE MODE	NONCAT COLD START MODE	NONCAT HOT START MODE	CATALYST COLD START MODE	CATALYST HOT START MODE
H-W	16.08	63.56%	5.42%	31.01%	55.22%	13.77%	63.90%	5.08%
H-S	12.83	40.65%	37.31%	22.04%	26.20%	51.76%	41.23%	36.73%
H-O	17.43	43.29%	20.96%	35.75%	27.87%	36.38%	43.91%	20.33%
MEANS	15.11	49.33%	22.06%	28.61%	36.77%	34.62%	49.84%	21.55%

TABLE E-68. EMFAC7F INPUT ASSUMPTIONS, NAS LEMOORE OFF-BASE HOUSING

SUMMARY OF INPUT ASSUMPTIONS:

CALENDAR YEAR: 1999 I&M PROGRAM: YES

VEHICLE MIX ASSUMPTIONS:

LDA	LDT	MDT	HDG	HDD	BUS	MCY
70.94%	25.50%	2.52%	0.00%	0.00%	0.00%	1.04%

AIR TEMPERATURE FOR EXHAUST RATES, SUMMER: 85 WINTER: 40

EVAPORATIVE EMISSIONS TEMPERATURE PATTERNS:

	MINIMUM	8 AM	9 AM	11 AM	1 PM	MAXIMUM
SUMMER	60	64	70	86	94	100
WINTER	35	35	37	43	49	50

OPERATING MODE ASSUMPTIONS BY TRIP TYPE:

	COLD START	HOT START	HOT STABLE	3-CATEGORY MIX BASIS:		
				WORK	SHOP	OTHER
H-W	60.64%	5.17%	34.19%	100.0%	0.0%	0.0%
H-S	41.95%	38.51%	19.54%	0.0%	100.0%	0.0%
H-O	45.36%	21.96%	32.68%	0.0%	0.0%	100.0%
O-W	39.94%	24.70%	35.36%	0.0%	0.0%	0.0%
O-O	22.55%	57.72%	19.73%	0.0%	0.0%	0.0%
WORK	60.64%	5.17%	34.19%			
SHOP	41.95%	38.51%	19.54%			
OTHER	45.36%	21.96%	32.68%			

NOTES: LDA = light duty autos  
LDT = light duty trucks  
MDT = medium duty trucks  
HDG = heavy duty gasoline-fueled vehicles  
HDD = heavy duty diesel-fueled vehicles  
BUS = diesel-fueled urban buses  
MCY = motorcycles  
H-W = home-work trips  
H-S = home-shopping trips  
H-O = home-other trips  
O-W = other-work trips  
O-O = other-other trips  
WORK = combined home-work and other-work trips  
SHOP = home-shopping trips  
OTHER = combined home-other and other-other trips

TABLE E-69. 1999 EMISSION RATES, NAS LEMOORE OFF-BASE HOUSING

POL- LUTANT	TRIP PURPOSE	GRAM/MILE RATES BY SPEED IN MPH				
		15	25	35	45	55
ROG	WORK	1.67	1.10	0.93	0.84	0.87
	SHOP	1.57	1.00	0.83	0.74	0.77
	OTHER	1.57	1.00	0.83	0.74	0.77
NOx	WORK	1.08	0.91	0.91	1.03	1.31
	SHOP	1.08	0.91	0.90	1.03	1.31
	OTHER	1.04	0.87	0.87	0.99	1.27
CO-S	WORK	12.41	10.22	9.23	8.78	9.31
	SHOP	11.52	9.33	8.35	7.89	8.43
	OTHER	11.38	9.19	8.21	7.75	8.29
CO-W	WORK	25.68	23.06	21.88	21.33	21.95
	SHOP	20.38	17.77	16.59	16.04	16.66
	OTHER	21.25	18.64	17.46	16.91	17.53
PMEX	WORK	0.01	0.01	0.01	0.01	0.01
	SHOP	0.01	0.01	0.01	0.01	0.01
	OTHER	0.01	0.01	0.01	0.01	0.01
PMTW	WORK	0.20	0.20	0.20	0.20	0.20
	SHOP	0.20	0.20	0.20	0.20	0.20
	OTHER	0.20	0.20	0.20	0.20	0.20
soak drnl/rstl						
	WORK	0.50	6.43			
	SHOP	0.50	6.43			
	OTHER	0.50	6.43			

TABLE E-70. EMFAC7F INPUT ASSUMPTIONS, NAF EL CENTRO OFF-BASE HOUSING

## SUMMARY OF INPUT ASSUMPTIONS:

CALENDAR YEAR: 1999

I&amp;M PROGRAM: YES

## VEHICLE MIX ASSUMPTIONS:

LDA	LDT	MDT	HDG	HDD	BUS	MCY
70.94%	25.50%	2.52%	0.00%	0.00%	0.00%	1.04%

AIR TEMPERATURE FOR EXHAUST RATES, SUMMER: 90 WINTER: 60

## EVAPORATIVE EMISSIONS TEMPERATURE PATTERNS:

	MINIMUM	8 AM	9 AM	11 AM	1 PM	MAXIMUM
SUMMER	78	81	85	96	101	105
WINTER	45	45	48	59	68	70

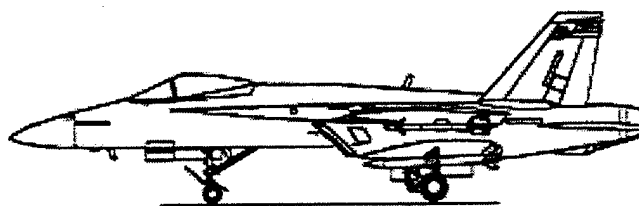
## OPERATING MODE ASSUMPTIONS BY TRIP TYPE:

	COLD START	HOT START	HOT STABLE	3-CATEGORY MIX BASIS:		
				WORK	SHOP	OTHER
H-W	63.56%	5.42%	31.02%	100.0%	0.0%	0.0%
H-S	40.65%	37.31%	22.04%	0.0%	100.0%	0.0%
H-O	43.29%	20.96%	35.75%	0.0%	0.0%	100.0%
O-W	39.94%	24.70%	35.36%	0.0%	0.0%	0.0%
O-O	22.55%	57.72%	19.73%	0.0%	0.0%	0.0%
WORK	63.56%	5.42%	31.02%			
SHOP	40.65%	37.31%	22.04%			
OTHER	43.29%	20.96%	35.75%			

NOTES: LDA = light duty autos  
 LDT = light duty trucks  
 MDT = medium duty trucks  
 HDG = heavy duty gasoline-fueled vehicles  
 HDD = heavy duty diesel-fueled vehicles  
 BUS = diesel-fueled urban buses  
 MCY = motorcycles  
 H-W = home-work trips  
 H-S = home-shopping trips  
 H-O = home-other trips  
 O-W = other-work trips  
 O-O = other-other trips  
 WORK = combined home-work and other-work trips  
 SHOP = home-shopping trips  
 OTHER = combined home-other and other-other trips

TABLE E-71. 1999 EMISSION RATES, NAF EL CENTRO OFF-BASE HOUSING

POL- LUTANT	TRIP PURPOSE	GRAM/MILE RATES BY SPEED IN MPH				
		15	25	35	45	55
ROG	WORK	1.81	1.15	0.96	0.87	0.90
	SHOP	1.68	1.02	0.84	0.74	0.78
	OTHER	1.67	1.01	0.83	0.73	0.77
NOx	WORK	1.11	0.93	0.93	1.05	1.34
	SHOP	1.07	0.90	0.89	1.02	1.30
	OTHER	1.03	0.86	0.85	0.97	1.26
CO-S	WORK	13.04	10.72	9.67	9.18	9.75
	SHOP	11.84	9.51	8.47	7.98	8.55
	OTHER	11.57	9.24	8.20	7.71	8.28
CO-W	WORK	18.43	16.23	15.23	14.77	15.28
	SHOP	14.37	12.16	11.16	10.70	11.21
	OTHER	14.72	12.51	11.52	11.05	11.56
PMEX	WORK	0.01	0.01	0.01	0.01	0.01
	SHOP	0.01	0.01	0.01	0.01	0.01
	OTHER	0.01	0.01	0.01	0.01	0.01
PMTW	WORK	0.20	0.20	0.20	0.20	0.20
	SHOP	0.20	0.20	0.20	0.20	0.20
	OTHER	0.20	0.20	0.20	0.20	0.20
soak drnl/rstl						
	WORK	0.50	8.11			
	SHOP	0.50	8.11			
	OTHER	0.50	8.11			



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## EMISSIONS ESTIMATES FOR PERSONAL VEHICLES

TABLE E-72. TRIP GENERATION ANALYSIS FOR THE NAS LEMOORE ALTERNATIVE

Land Use or Trip Generation Category	Trip Estimate Basis	Base Trip		Vehicle Generation Rate	P/A Trip Rate Splits		Base Trip		% Productions		Number of		Internal/		Net Trips	Adjusted Trip Rate	Trip Rate Adjustment Factor
		Rate	Rate		Productions	Attractions	Volume	W Internal	Destinations	Internal	Productions	Origins	Internal	External			
On-Base BOQ/BEQ Housing	757 Personnel	4.0	1.0	95%	5%	0%	3,028	0%	0%	0	0	0%	3,028	0	3,028	4.0	0.0%
On-Base Family Housing	399 Personnel	6.5	1.0	95%	5%	0%	2,594	0%	0%	0	0	0%	2,594	0	2,594	6.5	0.0%
Off-Base Housing	700 Personnel	6.5	1.0	95%	5%	0%	4,550	0%	0%	0	0	0%	4,550	0	4,550	6.5	0.0%
TOTALS	1,856 Personnel						10,172			0	0		10,172	0	10,172		0.0%

Notes: Trip generation rates assume somewhat lower than average trip rates compared to data from the ITE trip generation manual (Institute of Transportation Engineers, 1991).

No internal trip adjustments performed for this analysis.

TABLE E-73. TRIP PURPOSE DISAGGREGATION AND TRAVEL SPEED DISTRIBUTION FOR THE WAS LEMOORE ALTERNATIVE

Land Use	Trip Estimate Basis	Trip Purpose	Percent of Net Trips	Net Trip Rates	TCH Program Effect	Adjusted Net Trip Rate	Adjusted Net Trips	Overall TCH Effectiveness	Mean Trip Duration (Minutes)	Percent of Travel Time by Speed (mph)				
										15	25	35	45	55
On-Base BQ/BEQ Housing	757 Personnel	WORK	35.0%	1.4	0%	1.4	1,060		7.68	15.0%	25.0%	35.0%	20.0%	5.0%
		SHOPPING	40.0%	1.6	0%	1.6	1,211		10.78	10.0%	35.0%	35.0%	10.0%	10.0%
		OTHER	25.0%	1.0	0%	1.0	757		15.65	10.0%	25.0%	35.0%	15.0%	15.0%
On-Base Family Housing	399 Personnel	WORK	35.0%	2.3	0%	2.3	908		7.68	15.0%	25.0%	35.0%	20.0%	5.0%
		SHOPPING	40.0%	2.6	0%	2.6	1,038		10.78	10.0%	35.0%	35.0%	10.0%	10.0%
		OTHER	25.0%	1.6	0%	1.6	649		15.65	10.0%	25.0%	35.0%	15.0%	15.0%
Off-Base Housing	700 Personnel	WORK	35.0%	2.3	0%	2.3	1,593		16.10	5.0%	25.0%	30.0%	20.0%	20.0%
		SHOPPING	40.0%	2.6	0%	2.6	1,820		11.83	10.0%	35.0%	35.0%	10.0%	10.0%
		OTHER	25.0%	1.6	0%	1.6	1,138		15.45	10.0%	25.0%	35.0%	15.0%	15.0%
TOTALS							10,174	0.0%						

Notes: TCH = transportation control measures

Mean trip durations were derived from estimated travel time frequency distributions for home-work, home-shopping, and home-other trips, recognizing land use patterns and distances between communities surrounding WAS Lemoore.

Vehicle speed distributions were estimated from general road network features.

TABLE E-74. VEHICLE EMISSIONS FOR PERSONAL VEHICLE TRAVEL: NAS LEMOORE ALTERNATIVE

LAND USE	TRIP ESTIMATE BASIS	TRIP PURPOSE	AVERAGE		MEAN TRIP DURATION (MINUTES)	AVERAGE DISTANCE (MILES)	DAILY VMT BY TRIP PURPOSE	AVERAGE TRAVEL SPEED (MPH)	ROG Emissions (lbs/day)		NOx Emissions (lbs/day)		PM10 Emissions (lbs/day)		Summer CO Emissions (lbs/day)		Winter CO Emissions (lbs/day)		SOx Emissions (lbs/day)
			DAILY TRIPS	DAILY TRIP					ROG	NOx	PM10	Summer CO	Winter CO						
On-Base BQO/BEQ Housing	757 Personnel	WORK	1,060	7.7	4.16	4,410	32.5	16.4	11.2	30.2	116.2	286.1	0.3						
		SHOPPING	1,211	10.8	5.84	7,071	32.5	19.4	15.9	48.5	139.6	274.6	0.5						
		OTHER	757	15.7	9.13	6,911	35.0	16.1	15.0	47.4	127.2	266.2	0.5						
On-Base Family Housing	399 Personnel	WORK	908	7.7	4.16	3,777	32.5	12.9	9.6	25.9	99.6	245.1	0.2						
		SHOPPING	1,038	10.8	5.84	6,061	32.5	15.3	13.6	41.6	119.7	235.4	0.4						
		OTHER	649	15.7	9.13	5,925	35.0	13.0	12.9	40.6	109.1	228.2	0.4						
Off-Base Housing	700 Personnel	WORK	1,593	16.1	10.06	16,030	37.5	37.6	37.4	109.9	331.3	779.0	1.1						
		SHOPPING	1,820	11.8	6.41	11,662	32.5	28.4	25.7	80.0	224.0	437.5	0.8						
		OTHER	1,138	15.5	9.01	10,256	35.0	22.8	22.5	70.3	191.1	401.2	0.7						
.....																			
TOTALS:		WORK	3,561	11.5	6.80	24,216	35.6	66.9	58.2	166.1	547.1	1310.2	1.6						
		SHOPPING	4,069	11.3	6.09	24,795	32.5	63.1	55.2	170.0	483.2	947.4	1.6						
		OTHER	2,544	15.6	9.08	23,092	35.0	52.0	50.4	158.4	427.3	895.6	1.5						
			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
			10,174	12.4	7.09	72,103	34.3	182.0	163.8	494.5	1457.6	3153.2	4.8						
Base-Related Travel			3,561			24,216		66.9	58.2	166.1	547.1	1,310.2	1.6						
Other Household Travel			6,613			47,887		115.1	105.6	328.4	910.6	1,843.0	3.2						
.....																			

Notes: VMT = vehicle miles traveled  
 ROG = reactive organic compounds  
 NOx = nitrogen oxides  
 PM10 = inhalable particulate matter  
 CO = carbon monoxide  
 SOx = sulfur oxides

TABLE E-75. TRIP GENERATION ANALYSIS FOR THE NAF EL CENTRO ALTERNATIVE, PHASE 1

Land Use or Trip Generation Category	Trip Estimate Basis	Base Trip Generation		Vehicle Rate	P/A Trip Rate Splits	Base Trip Volume		% Productions W Internal		Number of Internal Trip Attractions		Internal Trips	External Trips	Net Trips	Adjusted Trip Rate	Trip Rate Adjustment Factor
		Rate	Productions			Productions	Destinations									
On-Base BOQ/BEQ Housing	749 Personnel	4.0	1.0	95%	5%	2,996	0%	0%	0	0%	0	2,996	2,996	2,996	4.0	0.0%
On-Base Family Housing	452 Personnel	6.5	1.0	95%	5%	2,938	0%	0%	0	0%	0	2,938	2,938	2,938	6.5	0.0%
Off-Base Housing	655 Personnel	6.5	1.0	95%	5%	4,258	0%	0%	0	0%	0	4,258	4,258	4,258	6.5	0.0%
TOTALS	1,856 Personnel					10,192			0		0	10,192	10,192	10,192		0.0%

Notes: Trip generation rates assume somewhat lower than average trip rates compared to data from the ITE trip generation manual (Institute of Transportation Engineers, 1991).  
No internal trip adjustments performed for this analysis.

TABLE E-76. TRIP PURPOSE DISAGGREGATION AND TRAVEL SPEED DISTRIBUTION FOR THE NAF EL CENTRO ALTERNATIVE, PHASE 1

Land Use	Trip Estimate Basis	Trip Purpose	Percent of Net Trips	Net Trip Rates	TCM Program Effect	Adjusted Net Trip Rate	Adjusted Net Trips	Overall TCM Effectiveness	Mean Trip Duration (Minutes)	Percent of Travel Time by Speed (mph)				
										15	25	35	45	55
On-Base BOQ/BEQ Housing	749 Personnel	WORK	35.0%	1.4	0%	1.4	1,049		7.68	80.0%	20.0%	0.0%	0.0%	0.0%
		SHOPPING	40.0%	1.6	0%	1.6	1,198		10.78	10.0%	35.0%	35.0%	10.0%	10.0%
		OTHER	25.0%	1.0	0%	1.0	749		15.65	10.0%	25.0%	35.0%	15.0%	15.0%
On-Base Family Housing	452 Personnel	WORK	35.0%	2.3	0%	2.3	1,028		7.68	80.0%	20.0%	0.0%	0.0%	0.0%
		SHOPPING	40.0%	2.6	0%	2.6	1,175		10.78	10.0%	35.0%	35.0%	10.0%	10.0%
		OTHER	25.0%	1.6	0%	1.6	735		15.65	10.0%	25.0%	35.0%	15.0%	15.0%
Off-Base Housing	655 Personnel	WORK	35.0%	2.3	0%	2.3	1,490		16.08	5.0%	25.0%	30.0%	20.0%	20.0%
		SHOPPING	40.0%	2.6	0%	2.6	1,703		12.83	10.0%	35.0%	35.0%	10.0%	10.0%
		OTHER	25.0%	1.6	0%	1.6	1,065		17.43	10.0%	25.0%	35.0%	15.0%	15.0%
TOTALS														
										</				

Notes: TCH = transportation control measures

Mean trip durations were derived from estimated travel time frequency distributions for home-work, home-shopping, and home-other trips, recognizing land use patterns and distances between communities surrounding NAF El Centro.

Vehicle speed distributions were estimated from general road network features.

TABLE E-77. VEHICLE EMISSIONS FOR PERSONAL VEHICLE TRAVEL: NAF EL CENTRO ALTERNATIVE, PHASE 1

LAND USE	TRIP ESTIMATE BASIS	TRIP PURPOSE	AVERAGE DAILY TRIPS	MEAN TRIP DURATION (MINUTES)	AVERAGE DISTANCE (MILES)	DAILY VMT BY TRIP PURPOSE	AVERAGE TRAVEL SPEED (MPH)	ROG Emissions (lbs/day)	NOx Emissions (lbs/day)	PM10 Emissions (lbs/day)	Summer CO Emissions (lbs/day)	Winter CO Emissions (lbs/day)	SOx Emissions (lbs/day)
On-Base BQ/BEQ Housing	749 Personnel	WORK	1,049	7.7	2.18	2,283	17.0	14.9	6.0	15.7	72.9	109.8	0.2
		SHOPPING	1,198	10.8	5.84	6,995	32.5	20.5	15.8	48.0	142.9	187.6	0.5
		OTHER	749	15.7	9.13	6,838	35.0	16.8	14.9	46.9	129.4	180.6	0.5
On-Base Family Housing	452 Personnel	WORK	1,028	7.7	2.18	2,237	17.0	12.8	5.9	15.3	71.4	107.6	0.1
		SHOPPING	1,175	10.8	5.84	6,861	32.5	18.3	15.5	47.1	140.2	184.0	0.5
		OTHER	735	15.7	9.13	6,710	35.0	15.4	14.7	46.0	127.0	177.2	0.4
Off-Base Housing	655 Personnel	WORK	1,490	16.1	10.05	14,974	37.5	37.0	35.7	102.7	324.2	507.1	1.0
		SHOPPING	1,703	12.8	6.95	11,835	32.5	29.6	25.8	81.2	231.0	300.6	0.8
		OTHER	1,065	17.4	10.17	10,828	35.0	24.2	23.4	74.3	201.8	280.6	0.7
TOTALS:													
		WORK	3,567	11.2	5.47	19,494	29.3	64.7	47.6	133.7	468.4	724.4	1.3
		SHOPPING	4,076	11.6	6.30	25,691	32.5	68.5	57.1	176.2	514.0	672.3	1.7
		OTHER	2,549	16.4	9.56	24,376	35.0	56.5	53.0	167.2	458.2	638.4	1.6
			10,192	12.7	6.83	69,562	32.3	189.7	157.7	477.1	1440.6	2035.2	4.6
	Base-Related Travel		3,567			19,494		64.7	47.6	133.7	468.4	724.4	1.3
	Other Household Travel		6,625			50,068		125.0	110.1	343.4	972.2	1,310.8	3.3

Notes: VMT = vehicle miles traveled

ROG = reactive organic compounds

NOx = nitrogen oxides

PM10 = inhalable particulate matter

CO = carbon monoxide

SOx = sulfur oxides

TABLE E-78. TRIP GENERATION ANALYSIS FOR THE NAF EL CENTRO ALTERNATIVE, PHASE 2

Land Use or Trip Generation Category	Trip Estimate Basis	Base Trip Generation Rate	Vehicle Rate	P/A Trip Rate Splits .....	% Productions		Number of % Attractions		Number of Internal/		Net Trips Generated	Trip Rate	
					Base Trip Volume	W Internal Destinations	Internal Trip Productions	W Internal Origins	Internal Trip Attractions	External Trips		Adjusted Trip Rate	Adjustment Factor
On-Base 800/800 Housing	1,422 Personnel	4.0	1.0	95%	5%	0%	0	0%	0	5,688	5,688	4.0	0.0%
On-Base Family Housing	775 Personnel	6.5	1.0	95%	5%	0%	0	0%	0	5,038	5,038	6.5	0.0%
Off-Base Housing	1,246 Personnel	6.5	1.0	95%	5%	0%	0	0%	0	8,099	8,099	6.5	0.0%
TOTALS	3,443 Personnel				18,825	.....	.....	.....	.....	18,825	18,825	0.0%	0.0%

Notes: Trip generation rates assume somewhat lower than average trip rates compared to data from the ITE trip generation manual (Institute of Transportation Engineers, 1991).  
No internal trip adjustments performed for this analysis.

TABLE E-79. TRIP PURPOSE DISAGGREGATION AND TRAVEL SPEED DISTRIBUTION FOR THE WAF EL CENTRO ALTERNATIVE, PHASE 2

Land Use	Trip Estimate Basis	Trip Purpose	Percent of Net Trips	Net Trip Rates	TCM Program Effect	Adjusted Net Trip Rate	Adjusted Net Trips	Overall TCM Effectiveness	Mean Trip Duration (Minutes)	Percent of Travel Time by Speed (mph)					
										15	25	35	45	55	
On-Base BQ/BEQ Housing	1,422 Personnel	WORK	35.0%	1.4	0%	1.4	1,991		7.68	80.0%	20.0%	0.0%	0.0%	0.0%	
		SHOPPING	40.0%	1.6	0%	1.6	2,275		10.78	10.0%	35.0%	35.0%	10.0%	10.0%	
		OTHER	25.0%	1.0	0%	1.0	1,422		15.65	10.0%	25.0%	35.0%	15.0%	15.0%	
On-Base Family Housing	775 Personnel	WORK	35.0%	2.3	0%	2.3	1,763		7.68	80.0%	20.0%	0.0%	0.0%	0.0%	
		SHOPPING	40.0%	2.6	0%	2.6	2,015		10.78	10.0%	35.0%	35.0%	10.0%	10.0%	
		OTHER	25.0%	1.6	0%	1.6	1,260		15.65	10.0%	25.0%	35.0%	15.0%	15.0%	
Off-Base Housing	1,246 Personnel	WORK	35.0%	2.3	0%	2.3	2,835		16.08	5.0%	25.0%	30.0%	20.0%	20.0%	
		SHOPPING	40.0%	2.6	0%	2.6	3,240		12.83	10.0%	35.0%	35.0%	10.0%	10.0%	
		OTHER	25.0%	1.6	0%	1.6	2,025		17.43	10.0%	25.0%	35.0%	15.0%	15.0%	
TOTALS											18,826	0.0%			

Notes: TCH = transportation control measures

Mean trip durations were derived from estimated travel time frequency distributions for home-work, home-shopping, and home-other trips, recognizing land use patterns and distances between communities surrounding MAS Lemoore.

Vehicle speed distributions were estimated from general road network features.

TABLE E-80. VEHICLE EMISSIONS FOR PERSONAL VEHICLE TRAVEL: NAF EL CENTRO ALTERNATIVE, PHASE 2

LAND USE	TRIP ESTIMATE BASIS	TRIP PURPOSE	AVERAGE		MEAN TRIP DURATION (MINUTES)	AVERAGE DISTANCE (MILES)	DAILY VMT BY TRIP PURPOSE	AVERAGE TRAVEL SPEED (MPH)	ROG Emissions (lbs/day)	NOx Emissions (lbs/day)	PM10 Emissions (lbs/day)	Summer CO		Winter CO		SOx Emissions (lbs/day)
			DAILY TRIPS	TRIP								Emissions (lbs/day)	Emissions (lbs/day)			
On-Base BOD/BEQ Housing	1,422 Personnel	WORK	1,991	7.7	2.18		4,332	17.0	28.2	11.4	29.7	138.3	208.3		0.3	
		SHOPPING	2,275	10.8	5.84		13,284	32.5	39.0	29.9	91.1	271.4	356.3		0.9	
		OTHER	1,422	15.7	9.13		12,982	35.0	32.0	28.3	89.0	245.7	342.9		0.9	
On-Base Family Housing	775 Personnel	WORK	1,763	7.7	2.18		3,836	17.0	22.0	10.1	26.3	122.4	184.5		0.3	
		SHOPPING	2,015	10.8	5.84		11,766	32.5	31.4	26.5	80.7	240.4	315.6		0.8	
		OTHER	1,260	15.7	9.13		11,503	35.0	26.5	25.1	78.9	217.7	303.8		0.8	
Off-Base Housing	1,246 Personnel	WORK	2,835	16.1	10.05		28,492	37.5	70.4	67.9	195.4	616.8	964.9		1.9	
		SHOPPING	3,240	12.8	6.95		22,517	32.5	56.3	49.2	154.4	439.4	572.0		1.5	
		OTHER	2,025	17.4	10.17		20,589	35.0	46.1	44.5	141.2	383.6	533.5		1.4	
.....																
TOTALS:			6,589	11.3	5.56		36,660	29.5	120.6	89.5	251.4	877.5	1357.7		2.4	
		WORK	7,530	11.7	6.32		47,567	32.5	126.7	105.6	326.2	951.1	1243.9		3.1	
		SHOPPING	4,707	16.4	9.58		45,074	35.0	104.5	98.0	309.1	847.0	1180.3		3.0	
		OTHER	18,826	12.7	6.87		129,301	32.4	351.8	293.1	886.8	2675.7	3781.9		8.6	
Base-Related Travel			6,589				36,660		120.6	89.5	251.4	877.5	1,357.7		2.4	
Other Household Travel			12,237				92,640		231.3	203.6	635.3	1,798.2	2,424.2		6.1	

Notes: VMT = vehicle miles traveled

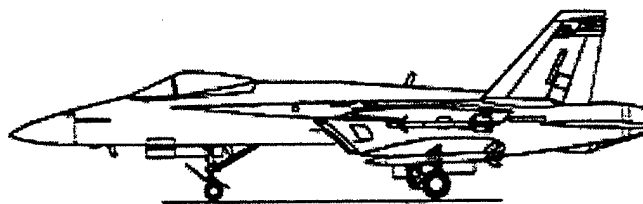
ROG = reactive organic compounds

NOx = nitrogen oxides

PM10 = inhalable particulate matter

CO = carbon monoxide

SOx = sulfur oxides



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## E-2 EMISSIONS ANALYSIS (CUMULATIVE)

TABLE E-81. DATA USED TO ESTIMATE EMISSIONS FROM ADDED E-2 FLIGHT OPERATIONS

Aircraft Type	Number of Engines	Engine Models Used For Emissions Analysis	Flight Operations Annual	Flight Activity	Fraction of Annual Flight Operations	Engine Power or Thrust Setting	Average Daily Flight Operations			Time In Mode (minutes)	Fuel Flow Rate per Engine (lb/hr)	Modal Emission Rate (pounds per 1,000 pounds fuel flow)					
							Total Annual Flight Operations	Spring	Fall			Winter	Total Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter
E-2	2	T56-A-16, T56-A-7	34,100	Departure	10.70%	G Idle 1	Taxi out	3,650	10.7	8.0	19.0	599	22.32	3.53	30.11	0.40	2.92
							Takeoff	3,650	10.7	8.0	0.5	2,219	0.16	10.45	0.65	0.40	1.78
							Climbout	3,650	10.7	8.0	2.5	2,136	0.14	10.29	0.68	0.40	1.57
				Arrival	10.70%	75%	Approach	3,650	10.7	8.0	5.6	1,996	0.19	9.93	0.42	0.40	2.85
							Taxi in	3,650	10.7	8.0	7.0	599	22.32	3.53	30.11	0.40	2.92
							G Idle 1										
				Touch-and-Go	3.23%	75%	Approach	550	1.6	1.2	4.5	1,996	0.19	9.93	0.42	0.40	2.85
							Climbout	550	1.6	1.2	2.3	2,136	0.14	10.29	0.68	0.40	1.57
							Circle	550	1.6	1.2	2.3	1,996	0.19	9.93	0.42	0.40	2.85
				FCLP	70.38%	75%	Approach	12,000	35.0	26.4	1.0	1,996	0.19	9.93	0.42	0.40	2.85
							Climbout	12,000	35.0	26.4	1.6	2,136	0.14	10.29	0.68	0.40	1.57
							Circle	12,000	35.0	26.4	1.4	1,996	0.19	9.93	0.42	0.40	2.85
				GCA Box	4.99%	75%	Approach	850	2.5	1.9	4.9	1,996	0.19	9.93	0.42	0.40	2.85
							Climbout	850	2.5	1.9	3.7	2,136	0.14	10.29	0.68	0.40	1.57
							Circle	850	2.5	1.9	7.1	1,996	0.19	9.93	0.42	0.40	2.85
E-2 Subtotal below 3,000 feet								34,100	99.6	75.0							

TABLE E-81. DATA USED TO ESTIMATE EMISSIONS FROM ADDED E-2 FLIGHT OPERATIONS

Notes:

FLCP = field carrier landing practice

GCA = ground controlled approach

G Idle 1 = low speed ground idle

Estimates of added flight operations for E-2 aircraft are based on 3,650 sorties per year, with the number of pattern events based on data from the NAS Lemoore BRAC-93 EIS. Departures and arrivals each represent a single flight operation; touch-and-go, FLCP, and GCA box patterns each represent two flight operations (an approach and a climbout). Flight operation totals are the sum of approach mode and takeoff/climbout mode numbers.

Time-in-mode estimates for E-2 operations below 3,000 feet modified from EPA default values based on flight profile data from Wyle Research (1994).

Circle time for repeated pattern operations (touch-and-go, FLCP, GCA) assumed to occur below 3,000 feet.

Engine power setting assumptions based on data from Navy Aircraft Environmental Support Office (AESO) personnel, NAS Lemoore personnel, EPA 1985, and EPA 1992.

Approach and circle mode power settings shown for E-2 aircraft are settings for available emission rates; actual flight mode settings are 40% for approach and 50% for circle modes.

Aircraft engine emission rates based on data from AESO Report 6-90, EPA 1985, and EPA 1992.

Taxi/idle times assume low speed ground idle.

Approach time-in-mode for direct arrivals is a weighted mean of straight-in approaches and overhead break approaches.

Approach time-in-mode for touch-and-go patterns assumes an overhead break approach pattern.

Particulate matter emission rates for E-2 aircraft are based on T56-A-7 engine data from EPA 1992.

Sulfur oxide emissions assume a fixed emission rate of 0.4 pounds per 1,000 pounds of fuel (0.02% fuel sulfur content).

Typical day operations assume 80% of annual operations during spring through fall (274 days) and 20% of annual operations during winter (91 days).

All values independently rounded for display after calculation.

Data Sources:

Wyle Research, 1994. Aircraft Noise Study for Naval Air Station Lemoore, California (NR 94-17).

U.S. Navy, 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).

U.S. Environmental Protection Agency, 1992. Procedures for Emission Inventory Preparation. Volume IV: Mobile Sources (EPA-450/4-81-026d(revised)).

TABLE E-82. ESTIMATED EMISSIONS FROM ADDED E-2 FLIGHT OPERATIONS

Air- craft Type	Flight Activity	Flight Mode	Average Daily Summer Emissions (pounds/day)					Average Daily Winter Emissions (pounds/day)					Total Emissions from Annual Flight Operations (tons/year)				
			Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter
E-2	Departure	Taxi out	90.6	14.3	122.2	1.6	11.9	67.7	10.7	91.4	1.2	8.9	15.45	2.44	20.85	0.28	2.02
		Takeoff	0.1	4.1	0.3	0.2	0.7	0.0	3.1	0.2	0.1	0.5	0.01	0.71	0.04	0.03	0.12
		Climbout	0.3	19.6	1.3	0.8	3.0	0.2	14.7	1.0	0.6	2.2	0.05	3.34	0.22	0.13	0.51
	Arrival	Approach	0.8	39.6	1.7	1.6	11.4	0.6	29.6	1.3	1.2	8.5	0.13	6.75	0.29	0.27	1.94
		Taxi in	33.4	5.3	45.0	0.6	4.4	25.0	3.9	33.7	0.4	3.3	5.69	0.90	7.68	0.10	0.74
	Touch- and-Go	Approach	0.1	4.8	0.2	0.2	1.4	0.1	3.6	0.2	0.1	1.0	0.02	0.82	0.03	0.03	0.23
		Climbout	0.0	2.7	0.2	0.1	0.4	0.0	2.0	0.1	0.1	0.3	0.01	0.46	0.03	0.02	0.07
		Circle	0.0	2.4	0.1	0.1	0.7	0.0	1.8	0.1	0.1	0.5	0.01	0.42	0.02	0.02	0.12
	FCLP	Approach	0.4	23.1	1.0	0.9	6.6	0.3	17.4	0.7	0.7	5.0	0.08	3.96	0.17	0.16	1.14
		Climbout	0.6	41.0	2.7	1.6	6.3	0.4	30.9	2.0	1.2	4.7	0.10	7.03	0.46	0.27	1.07
		Circle	0.6	32.4	1.4	1.3	9.3	0.5	24.4	1.0	1.0	7.0	0.11	5.55	0.23	0.22	1.59
	GCA Box	Approach	0.2	8.1	0.3	0.3	2.3	0.1	6.2	0.3	0.2	1.8	0.03	1.38	0.06	0.06	0.39
		Climbout	0.1	6.8	0.4	0.3	1.0	0.1	5.2	0.3	0.2	0.8	0.02	1.15	0.08	0.04	0.18
		Circle	0.2	11.7	0.5	0.5	3.4	0.2	8.9	0.4	0.4	2.6	0.04	1.99	0.08	0.08	0.57
E-2 below 3,000 feet			127.3	215.9	177.3	10.0	62.7	95.2	162.4	132.6	7.5	47.1	21.72	36.91	30.25	1.71	10.71

TABLE E-82. ESTIMATED EMISSIONS FROM ADDED E-2 FLIGHT OPERATIONS

Notes:

FLCP = field carrier landing practice  
GCA = ground controlled approach  
G Idle 1 = low speed ground idle

Typical day operations assume 80% of annual operations during spring through fall (274 days) and 20% of annual operations during winter (91 days).  
All values independently rounded for display after calculation.

Data Sources:

Hyle Research, 1994. Aircraft Noise Study for Naval Air Station Lemoore, California (NR 94-17).  
U.S. Navy, 1990. Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (AESO Report No. 6-90).  
U.S. Environmental Protection Agency, 1992. Procedures for Emission Inventory Preparation. Volume IV: Mobile Sources (EPA-450/4-81-026d(revised)).

TABLE E-83. ESTIMATED EMISSIONS FROM E-2 ENGINE RUN-UPS AND TEST CELL RUN-UPS

Run-Up Type	Engine Models Used For Emissions Analysis	Annual Run-Up Events	Engine Mode	Time In Mode (minutes)	Fuel Flow Rate per Engine (lb/hr)	Modal Emission Rate (pounds per 1,000 pounds fuel flow)					Total Emissions from Annual Engine Run-Ups (tons/year)					
						Total Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	
In-Frame, Long Test	T56-A-16, T56-A-7	826	G Idle 1 75% Military	10	599	22.32	3.53	30.11	0.40	2.92	0.92	0.15	1.24	0.02	0.12	
				15	1,996	0.19	9.93	0.42	0.40	2.85	0.04	2.05	0.09	0.08	0.59	
				5	2,219	0.16	10.45	0.65	0.40	1.78	0.01	0.80	0.05	0.03	0.14	
				Subtotal: 0.97 2.99 1.38 0.13 0.84												
In-Frame, Short Test	T56-A-16, T56-A-7	208	G Idle 1 F Idle 75% 100% Military	8	599	22.32	3.53	30.11	0.40	2.92	0.19	0.03	0.25	0.00	0.02	
				8	836	1.10	6.52	4.54	0.40	2.92	0.01	0.08	0.05	0.00	0.03	
				2	1,996	0.19	9.93	0.42	0.40	2.85	0.00	0.07	0.00	0.00	0.02	
				1.6	2,136	0.14	10.29	0.68	0.40	1.57	0.00	0.06	0.00	0.00	0.01	
				0.4	2,219	0.16	10.45	0.65	0.40	1.78	0.00	0.02	0.00	0.00	0.00	
Subtotal: 0.20 0.25 0.31 0.01 0.09																
Test Cell	T56-A-16, T56-A-7	312	F Idle 75% 100% Military	10	836	1.10	6.52	4.54	0.40	2.92	0.02	0.14	0.10	0.01	0.06	
				15	1,996	0.19	9.93	0.42	0.40	2.85	0.01	0.77	0.03	0.03	0.22	
				10	2,136	0.14	10.29	0.68	0.40	1.57	0.01	0.57	0.04	0.02	0.09	
				5	2,219	0.16	10.45	0.65	0.40	1.78	0.00	0.30	0.02	0.01	0.05	
Subtotal: 0.05 1.79 0.19 0.07 0.42																
Total In-Frame Run-Ups																
											Run-Ups:	1.17	3.24	1.69	0.14	0.93
Combined In-Frame Run-Ups and Test Cell																
											Total:	1.22	5.03	1.88	0.22	1.36

## Notes:

- In-frame long test engine run-ups: 2.15 per engine per aircraft per month (MCAS Hiramair Conformity Analysis, Volume I, Table B-5; 1990 test rate).
- In-frame short test engine run-ups: 13 per aircraft per year (MCAS Hiramair Conformity Analysis, Volume II, Table B-1; 1990 test rate).
- In-frame run-up time-in-mode assumptions from MCAS Hiramair Conformity Analysis (Volume I, Table B-5; Volume I, Table B-1).
- Test cell run-ups: assume 6 engine tests per week (E-2 engines plus additional T-56 engines from MCAS Hiramair KC-130 aircraft).
- Test cell time-in-mode assumptions: similar to in-frame long test, except flight idle instead of ground idle and with 10 minutes at 100% setting added.

TABLE E-84. ESTIMATED EMISSIONS FROM TOW TRACTORS AND RELATED AIRCRAFT SUPPORT EQUIPMENT

GSE Vehicle Type	Vehicle Fuel	Typical In-use HP Load Rating	Aircraft Event	Annual Number of Events	Vehicle Use Per Event (minutes)	Emission Rate (grams per horsepower-hour)						Total Emissions from Annual GSE Equipment Use (tons/year)				
						Total Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	Reactive Organics	Nitrogen Oxides	Carbon Monoxide	Sulfur Oxides	Particulate Matter	
Misc. equip. (175 HP @ 40%)	Gasoline	70	Departures	3,650	15	12.22	5.16	258.7	0.027	0.06	0.86	0.36	18.22	0.002	0.004	
		70	Arrivals	3,650	15	12.22	5.16	258.7	0.027	0.06	0.86	0.36	18.22	0.002	0.004	
Tow Tractors (200 HP @ 40%)	Diesel	80	Departures	3,650	15	1.6	14.0	6.06	0.93	1.6	0.13	1.13	0.49	0.07	0.13	
		80	Arrivals	3,650	15	1.6	14.0	6.06	0.93	1.6	0.13	1.13	0.49	0.07	0.13	
TOTALS											TOTAL:	2.0	3.0	37.4	0.2	0.3

## Notes:

Aircraft support equipment includes tow tractors, cargo loaders, and related flight line service equipment.

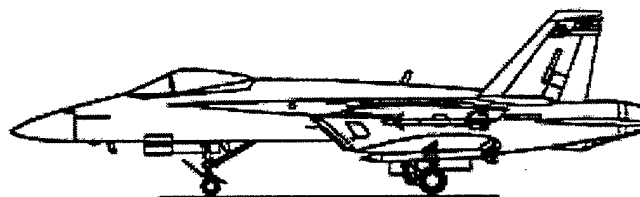
In use horsepower load values rounded from EPA default averages of rated horsepower times typical load factor.

Gasoline-fueled equipment emission factors reflect EPA in-use adjustments.

Vehicle use per aircraft event are generalized estimates.

## Data Source:

U.S. EPA 1991. Nonroad Engine and Vehicle Emission Study - Report. (ANR-443). NITS PB92126960.



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EMISSIONS SUMMARY FOR CLEAN AIR ACT  
CONFORMITY DETERMINATION, NAS LEMOORE

TABLE E-85. ANNUAL EMISSIONS FOR F/A-18E/F SQUADRON ACTIVITY, NAS LEMOORE ALTERNATIVE

YEAR	EMISSIONS COMPONENT	ESTIMATED ANNUAL EMISSIONS, TONS PER YEAR				
		REACTIVE ORGANIC COMPOUNDS	NITROGEN OXIDES	CARBON MONOXIDE	SULFUR OXIDES	PM10
1999	Construction Activity	1.42	20.74	9.71	2.08	14.35
	1999 CAA Conformity Total	1.42	20.74	9.71	2.08	14.35
2000	Construction Activity	0.89	12.83	6.37	1.29	8.20
	F/A-18 E/F Operations	116.99	121.20	501.01	3.90	62.93
	F/A-18 E/F Engine Run-Ups	5.11	4.75	25.08	0.17	2.65
	Aircraft Refueling	0.21	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	5.14	2.55	107.84	0.01	0.07
	Other Permit-Exempt Equipment	0.10	1.40	0.75	0.09	0.13
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	4.01	3.49	55.72	0.10	9.96
	2000 CAA Conformity Total	132.45	146.22	696.78	5.56	83.95
2001	Construction Activity	0.84	12.39	5.55	1.26	7.64
	F/A-18 E/F Operations	214.79	221.50	919.83	7.13	115.20
	F/A-18 E/F Engine Run-Ups	9.62	8.94	47.21	0.32	4.98
	Aircraft Refueling	0.38	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	9.44	4.68	198.01	0.03	0.14
	Other Permit-Exempt Equipment	0.19	2.63	1.41	0.16	0.24
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	5.22	4.54	72.43	0.12	12.95
	2001 CAA Conformity Total	240.47	254.68	1,244.44	9.02	141.16
2002	Construction Activity	0.78	11.57	5.23	1.17	7.37
	F/A-18 E/F Operations	235.86	238.24	1,009.83	7.70	124.81
	F/A-18 E/F Engine Run-Ups	11.72	10.89	57.54	0.38	6.08
	Aircraft Refueling	0.44	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	10.36	5.14	217.47	0.03	0.15
	Other Permit-Exempt Equipment	0.24	3.21	1.72	0.20	0.29
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	6.42	5.59	89.15	0.15	15.94
	2002 CAA Conformity Total	265.81	274.64	1,380.93	9.64	154.63

TABLE E-85. ANNUAL EMISSIONS FOR F/A-18E/F SQUADRON ACTIVITY, NAS LEMOORE ALTERNATIVE

		ESTIMATED ANNUAL EMISSIONS, TONS PER YEAR				
YEAR	EMISSIONS COMPONENT	REACTIVE ORGANIC COMPOUNDS	NITROGEN OXIDES	CARBON MONOXIDE	SULFUR OXIDES	PM10
2003.	F/A-18 E/F Operations	256.93	254.98	1,099.83	8.28	134.42
2004	F/A-18 E/F Engine Run-Ups	13.82	12.85	67.86	0.45	7.17
	Aircraft Refueling	0.49	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	11.29	5.60	236.93	0.03	0.16
	Other Permit-Exempt Equipment	0.28	3.79	2.03	0.24	0.34
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	8.02	6.99	111.44	0.19	19.93
	2003 CAA Conformity Total	290.84	284.20	1,518.09	9.19	162.02
2005	Added E/F vs Replaced C/D Operations	259.35	258.68	1,136.18	8.29	134.64
	Added E/F vs replaced C/D Run-Ups	13.96	12.90	67.25	0.46	7.23
	Aircraft Refueling	0.49	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	11.29	5.60	236.93	0.03	0.16
	Other Permit-Exempt Equipment	0.28	3.79	2.03	0.24	0.34
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	8.02	6.99	111.44	0.19	19.93
	2005 CAA Conformity Total	293.40	287.95	1,553.82	9.20	162.30
2006	Added E/F vs Replaced C/D Operations	261.77	262.38	1,172.53	8.30	134.85
	Added E/F vs replaced C/D Run-Ups	14.10	12.96	66.63	0.46	7.29
	Aircraft Refueling	0.49	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	11.29	5.60	236.93	0.03	0.16
	Other Permit-Exempt Equipment	0.28	3.79	2.03	0.24	0.34
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	8.02	6.99	111.44	0.19	19.93
	2006 CAA Conformity Total	295.96	291.71	1,589.55	9.21	162.57
2007	Added E/F vs Replaced C/D Operations	264.19	266.08	1,208.88	8.31	135.07
	Added E/F vs replaced C/D Run-Ups	14.24	13.02	66.01	0.46	7.35
	Aircraft Refueling	0.49	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	11.29	5.60	236.93	0.03	0.16
	Other Permit-Exempt Equipment	0.28	3.79	2.03	0.24	0.34
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	8.02	6.99	111.44	0.19	19.93
	2007 CAA Conformity Total	298.52	295.47	1,625.28	9.22	162.85

TABLE E-85. ANNUAL EMISSIONS FOR F/A-18E/F SQUADRON ACTIVITY, NAS LEMOORE ALTERNATIVE

YEAR	EMISSIONS COMPONENT	ESTIMATED ANNUAL EMISSIONS, TONS PER YEAR				
		REACTIVE ORGANIC COMPOUNDS	NITROGEN OXIDES	CARBON MONOXIDE	SULFUR OXIDES	PM10
2008	Added E/F vs Replaced C/D Operations	266.62	269.78	1,245.22	8.32	135.29
	Added E/F vs replaced C/D Run-Ups	14.38	13.07	65.39	0.46	7.41
	Aircraft Refueling	0.49	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	11.29	5.60	236.93	0.03	0.16
	Other Permit-Exempt Equipment	0.28	3.79	2.03	0.24	0.34
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	8.02	6.99	111.44	0.19	19.93
	2008 CAA Conformity Total	301.08	299.22	1,661.01	9.24	163.12
2009	Added E/F vs Replaced C/D Operations	269.04	273.48	1,281.57	8.33	135.50
	Added E/F vs replaced C/D Run-Ups	14.52	13.13	64.78	0.46	7.47
	Aircraft Refueling	0.49	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	11.29	5.60	236.93	0.03	0.16
	Other Permit-Exempt Equipment	0.28	3.79	2.03	0.24	0.34
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	8.02	6.99	111.44	0.19	19.93
	2009 CAA Conformity Total	303.64	302.98	1,696.74	9.25	163.40
2010	Added E/F vs Replaced C/D Operations	271.46	277.18	1,317.92	8.34	135.72
	Added E/F vs replaced C/D Run-Ups	14.66	13.18	64.16	0.46	7.53
	Aircraft Refueling	0.49	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	11.29	5.60	236.93	0.03	0.16
	Other Permit-Exempt Equipment	0.28	3.79	2.03	0.24	0.34
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	8.02	6.99	111.44	0.19	19.93
	2010 CAA Conformity Total	306.20	306.74	1,732.48	9.26	163.68

TABLE E-85. ANNUAL EMISSIONS FOR F/A-18E/F SQUADRON ACTIVITY, NAS LEMOORE ALTERNATIVE

YEAR	EMISSIONS COMPONENT	ESTIMATED ANNUAL EMISSIONS, TONS PER YEAR				
		REACTIVE ORGANIC COMPOUNDS	NITROGEN OXIDES	CARBON MONOXIDE	SULFUR OXIDES	PM10
	Maximum CAA Conformity Analysis Emissions	306.20	306.74	1,732.48	9.64	163.68
	De Minimis Threshold	50.00	50.00	na	na	70.00
	Above De Minimis Level?	YES	YES	NO	NO	YES
	Reserved Conformity Offsets	100.00	367.10	na	na	151.60
	Other Available Offsets	0.00	0.00	0.00	0.00	0.00
	-----	-----	-----	-----	-----	-----
	Net Conformity Emissions Change	206.20	(60.36)	1,732.48	9.64	12.08
	Conformity Offset Requirements	206.20	(60.36)	na	na	12.08
<hr/>						
2010	Base-Related CAA Conformity Analysis Emissions	306.20	306.74	1,732.48	9.26	163.68
	Engine Test Cell	4.91	33.31	149.21	0.53	2.70
	Other On-Base Permit Sources	1.68	0.15	0.11	0.00	0.05
	Off-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Additional Household Travel	21.01	19.27	251.26	0.58	59.93
	-----	-----	-----	-----	-----	-----
	Maximum Annual Total Emissions	333.80	359.47	2,133.06	10.36	226.36

Notes: na = not applicable; conformity requirements apply only to nonattainment pollutants.

Construction emission estimates assume all aircraft-related facilities, one BEQ, and 100 units of family housing will be constructed in 1999. Other housing and personnel support facility construction is assumed to occur in stages during 2000-2002.

Phase 1 analyses assume that 20 FRS aircraft will arrive in 2000 and 16 FRS aircraft will arrive in 2001; in addition, one fleet squadron will arrive each year from 2000 through 2003.

Phase 2 aircraft arrivals will be one-for-one replacements of F/A-18C/D aircraft that are already based at NAS Lemoore, with aircraft for one squadron replaced each year from 2005 through 2010.

In-frame engine run-up emission estimates assume 57.4 low power run-ups (10 minutes) per aircraft per year plus 3.2 high power run-ups (28.5 minutes) per aircraft per year. Each run-up event tests a single engine.

Aircraft refueling emission estimates are based on 80% splash loading of aircraft fuel tanks at fuel pit facilities and 20% splash loading of fuel trucks with subsequent splash loading of aircraft; emission rates reflect monthly temperature patterns at NAS Lemoore.

TABLE E-85. ANNUAL EMISSIONS FOR F/A-18E/F SQUADRON ACTIVITY, NAS LEMOORE ALTERNATIVE

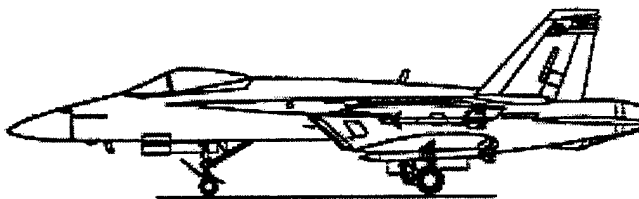
Aircraft support equipment includes tow tractors and weapons loaders.  
 Other permit-exempt equipment includes portable or stationary engines used for pumps, fans, compressors, generators, hoists, hydraulic test stands, air start units, etc.  
 On-base natural gas use includes space heating and water heating for residential, office, and industrial buildings that do not have central boilers large enough to require APCD permits. Emissions are less than 0.005 tons per year for any pollutant.  
 Base-related vehicle traffic includes only work-related trips (240 days per year).  
 Reserved conformity offsets for NAS Lemoore were established when Castle Air Force Base closed.  
 Engine test cell emission estimates assume 4.77 single engine tests per aircraft per year, 53% schedule checks (14 minutes) and 47% break-in tests (84.5 minutes).  
 Engine test cell emissions for 2010 include testing of Phase 1 aircraft engines plus the change in emissions when Phase 2 F/A-18E/F aircraft are substituted for F/A-18C/D aircraft.  
 Other on-base permit sources include boilers in hangars and BEQs; paint, solvent, and abrasive blasting facilities; and the Navy exchange gas station.  
 Off-base natural gas use includes space heating and water heating for off-base housing. Emissions are less than 0.005 tons per year for any pollutant.  
 Additional household vehicle travel is not related to on-base land uses, and includes all shopping and other trips.  
 Base-related and additional household vehicle travel emission estimates were calculated for full Phase 1 conditions; intermediate year vehicle emissions were estimated as a percent of 2003 emissions: 50% for 1999 and 2000, 65% for 2001, and 80% for 2002. Phase 2 aircraft arrivals will not produce further increases in personnel.

Data Sources:

- Castro, Tim. 1997a. 10-08-97 Fax, Annual Emissions from NAS Lemoore "Huffers" and TSE. Fax sent by Tim Castro, NAS Lemoore.
- Castro, Tim. 1997b. 10-08-97 Fax, Title V Emissions Inventory, Sep 96-Aug 97; TITVREP.XLS Printout. Fax sent by Tim Castro, NAS Lemoore.
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- Thompson, S. 1997. 7-18-97 E-Mail Memo, Best Estimates for Time-In-Mode Values, F/A-18 E/F Aircraft. From Lt. Thompson, E/F FIT, NAS Lemoore.
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- U.S. Environmental Protection Agency. 1992. Procedures for Emission Inventory Preparation. Volume IV: Mobile Sources. (EPA-450/4-81-126d (revised)).
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TABLE E-85. ANNUAL EMISSIONS FOR F/A-18E/F SQUADRON ACTIVITY, NAS LEMOORE ALTERNATIVE

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DRAFT CONFORMITY DETERMINATION FOR THE  
NAF EL CENTRO ALTERNATIVE

**DRAFT CLEAN AIR ACT CONFORMITY DETERMINATION,  
FACILITIES TO SUPPORT F/A-18 E/F AIRCRAFT  
AT NAF EL CENTRO**

**APPLICABILITY ANALYSIS**

NAF El Centro is located in the portion of Imperial County, California that is included within the Salton Sea Air Basin. The Salton Sea Air Basin is designated a transitional ozone nonattainment area and a moderate PM<sub>10</sub> nonattainment area. The de minimis thresholds applicable to the Salton Sea Air Basin are 100 tons per year for reactive organic compounds, 100 tons per year for nitrogen oxides, and 100 tons per year for PM<sub>10</sub>.

Some emission sources associated with the proposed NAF El Centro Alternative are exempt from consideration under the general conformity rule. Exempt emission sources include stationary sources that require permits from the Imperial County Air Pollution Control District (APCD) and emission sources that are not under Navy control.

Various new facilities would be needed at NAF El Centro to support the F/A-18E/F squadrons. Some of these facilities would include equipment that would require air quality permits from the Imperial County APCD. Facilities and equipment covered by new, existing, or amended, APCD permits are exempt from consideration in a conformity determination. Examples of emission sources that are exempt from consideration in a conformity determination include engine test cells; boilers used for space heating and water heating; and various painting, degreasing, and abrasive blasting facilities used for aircraft and engine maintenance.

Some portable equipment associated with aircraft maintenance activities plus some equipment associated with aircraft flight operations may be subject to APCD permit requirements. For some of this equipment, the Navy has the option of registering the equipment as a mobile source instead of having it permitted as a stationary source. For purposes of this conformity determination, all such equipment has been treated as permit-exempt mobile source equipment, and included in the conformity analysis.

Vehicle travel associated with added military and civilian personnel has been separated into base-related travel (work-related trips) and other household travel (shopping and other nonwork trips). Emissions associated with base-related travel are included in the conformity analysis. Emissions associated with off-base housing units (space heating, water heating, etc.) are not under Navy control, and are excluded from the conformity analysis.

**SUMMARY OF ADDED EMISSIONS**

Conformity-related emission estimates for the F/A-18E/F action are summarized in Table E-86. The maximum annual conformity-related emissions will be 418.50 tons per year of reactive organic compounds, 385.46 tons per year of nitrogen oxides, and 226.33 tons per year of PM<sub>10</sub>. These emission increases exceed the relevant de minimis levels for the Salton Sea Air Basin (100 tons per year each for reactive organic compounds, nitrogen oxides, and PM<sub>10</sub>). Consequently, the conformity determination for facilities to support F/A-18E/F aircraft basing at NAF El Centro needs to address both ozone and PM<sub>10</sub> emissions.

## *OPTIONS FOR DEMONSTRATING CONFORMITY WITH THE OZONE AND PM<sub>10</sub> SIPs FOR THE SALTON SEA AIR BASIN*

The conformity-related emissions of ozone and PM<sub>10</sub> precursors can be remedied in one of two ways:

- by the Navy obtaining a commitment from the Imperial County APCD to modify the ozone and PM<sub>10</sub> SIPs to specifically account for the F/A-18E/F action at NAF El Centro; or
- by the Navy obtaining adequate ozone precursor and PM<sub>10</sub> emission offsets (418.50 tons per year of reactive organic compounds, 385.46 tons per year of nitrogen oxides, and 226.33 tons per year of PM<sub>10</sub>) from on-base or off-base sources.

### *STATEMENT OF CONFORMITY*

Maximum annual conformity-related emission increases associated with facilities to support F/A-18E/F aircraft at NAF El Centro will be 418.50 tons per year of reactive organic compounds, 385.46 tons per year of nitrogen oxides, and 226.33 tons per year of PM<sub>10</sub>. These conformity-related emission increases will be addressed by:

- the Navy obtaining a commitment from the Imperial County APCD to modify the ozone and PM<sub>10</sub> SIPs to specifically account for the F/A-18E/F action at NAF El Centro; or
- the Navy obtaining adequate ozone precursor and PM<sub>10</sub> emission offsets (418.50 tons per year of reactive organic compounds, 385.46 tons per year of nitrogen oxides, and 226.33 tons per year of PM<sub>10</sub>) from on-base or off-base sources.

NAF El Centro will follow Imperial County APCD procedures to ensure that new, relocated, or modified facilities and equipment meet applicable rules and regulations (including all SIP requirements) prior to facility construction or installation.

TABLE E-86. ANNUAL EMISSIONS FOR F/A-18E/F SQUADRON ACTIVITY, NAF EL CENTRO ALTERNATIVE

YEAR	EMISSIONS COMPONENT	ESTIMATED ANNUAL EMISSIONS, TONS PER YEAR				
		REACTIVE ORGANIC COMPOUNDS	NITROGEN OXIDES	CARBON MONOXIDE	SULFUR OXIDES	PM10
1999	Construction Activity	3.52	51.00	24.42	5.09	29.99
	1999 CAA Conformity Total	3.52	51.00	24.42	5.09	29.99
2000	Construction Activity	1.56	22.78	10.41	2.30	13.30
	F/A-18 E/F Operations	116.99	121.20	501.01	3.90	62.93
	F/A-18 E/F Engine Run-Ups	5.11	4.75	25.08	0.17	2.65
	Aircraft Refueling	0.30	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	5.14	2.55	107.84	0.01	0.07
	Other Permit-Exempt Equipment	0.10	1.40	0.75	0.09	0.13
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	3.88	2.86	35.79	0.08	8.02
	2000 CAA Conformity Total	133.08	155.53	680.89	6.54	87.11
2001	Construction Activity	0.91	13.42	6.06	1.36	6.96
	F/A-18 E/F Operations	214.79	221.50	919.83	7.13	115.20
	F/A-18 E/F Engine Run-Ups	9.62	8.94	47.21	0.32	4.98
	Aircraft Refueling	0.56	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	9.44	4.68	198.01	0.03	0.14
	Other Permit-Exempt Equipment	0.19	2.63	1.41	0.16	0.24
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	5.04	3.72	46.52	0.10	10.43
	2001 CAA Conformity Total	240.56	254.89	1,219.04	9.10	137.94
2002	Construction Activity	0.87	12.70	5.76	1.28	6.73
	F/A-18 E/F Operations	235.86	238.24	1,009.83	7.70	124.81
	F/A-18 E/F Engine Run-Ups	11.72	10.89	57.54	0.38	6.08
	Aircraft Refueling	0.65	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	10.36	5.14	217.47	0.03	0.15
	Other Permit-Exempt Equipment	0.24	3.21	1.72	0.20	0.29
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	6.21	4.57	57.26	0.12	12.83
	2002 CAA Conformity Total	265.91	274.76	1,349.57	9.73	150.89

TABLE E-86. ANNUAL EMISSIONS FOR F/A-18E/F SQUADRON ACTIVITY, NAF EL CENTRO ALTERNATIVE

YEAR	EMISSIONS COMPONENT	ESTIMATED ANNUAL EMISSIONS, TONS PER YEAR				
		REACTIVE ORGANIC COMPOUNDS	NITROGEN OXIDES	CARBON MONOXIDE	SULFUR OXIDES	PM10
2003.	F/A-18 E/F Operations	256.93	254.98	1,099.83	8.28	134.42
2004	F/A-18 E/F Engine Run-Ups	13.82	12.85	67.86	0.45	7.17
	Aircraft Refueling	0.73	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	11.29	5.60	236.93	0.03	0.16
	Other Permit-Exempt Equipment	0.28	3.79	2.03	0.24	0.34
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	7.76	5.72	71.57	0.15	16.04
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	2003 CAA Conformity Total	290.81	282.93	1,478.22	9.15	158.13
2005	Construction Activity	1.72	24.34	12.19	2.41	12.27
	Added E/F vs Replaced C/D Operations	274.98	269.33	1,176.97	8.77	142.65
	Added E/F vs replaced C/D Run-Ups	15.03	13.86	71.09	0.50	7.89
	Aircraft Refueling	0.80	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	12.08	5.99	253.61	0.03	0.17
	Other Permit-Exempt Equipment	0.31	4.28	2.29	0.27	0.39
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	8.88	6.55	81.99	0.18	18.40
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	2005 CAA Conformity Total	313.81	324.35	1,598.14	12.16	181.77
2006	Construction Activity	2.26	32.27	15.44	3.24	18.16
	Added E/F vs Replaced C/D Operations	293.04	283.67	1,254.10	9.26	150.89
	Added E/F vs replaced C/D Run-Ups	16.24	14.88	74.32	0.55	8.61
	Aircraft Refueling	0.87	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	12.88	6.38	270.28	0.04	0.19
	Other Permit-Exempt Equipment	0.35	4.78	2.56	0.30	0.43
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	10.00	7.39	92.42	0.20	20.75
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	2006 CAA Conformity Total	335.63	349.38	1,709.12	13.58	199.02

TABLE E-86. ANNUAL EMISSIONS FOR F/A-18E/F SQUADRON ACTIVITY, NAF EL CENTRO ALTERNATIVE

YEAR	EMISSIONS COMPONENT	ESTIMATED ANNUAL EMISSIONS, TONS PER YEAR				
		REACTIVE ORGANIC COMPOUNDS	NITROGEN OXIDES	CARBON MONOXIDE	SULFUR OXIDES	PM10
2007	Construction Activity	1.73	24.89	12.53	2.47	12.96
	Added E/F vs Replaced C/D Operations	311.10	298.02	1,331.24	9.75	159.13
	Added E/F vs replaced C/D Run-Ups	17.45	15.90	77.55	0.59	9.32
	Aircraft Refueling	0.94	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	13.67	6.78	286.96	0.04	0.20
	Other Permit-Exempt Equipment	0.39	5.27	2.82	0.33	0.47
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	11.12	8.23	102.84	0.22	23.11
	2007 CAA Conformity Total	356.38	359.08	1,813.94	13.40	205.19
2008	Construction Activity	0.87	12.85	6.07	1.28	6.32
	Added E/F vs Replaced C/D Operations	329.15	312.36	1,408.38	10.24	167.36
	Added E/F vs replaced C/D Run-Ups	18.65	16.92	80.78	0.64	10.04
	Aircraft Refueling	1.01	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	14.47	7.17	303.64	0.04	0.21
	Other Permit-Exempt Equipment	0.42	5.76	3.09	0.36	0.52
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	12.23	9.07	113.26	0.25	25.46
	2008 CAA Conformity Total	376.80	364.13	1,915.21	12.81	209.92
2009	Construction Activity	0.87	12.85	6.07	1.28	5.96
	Added E/F vs Replaced C/D Operations	347.21	326.71	1,485.51	10.74	175.60
	Added E/F vs replaced C/D Run-Ups	19.86	17.93	84.00	0.69	10.76
	Aircraft Refueling	1.08	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	15.26	7.57	320.32	0.04	0.22
	Other Permit-Exempt Equipment	0.46	6.26	3.35	0.39	0.55
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	13.35	9.90	123.69	0.27	27.82
	2009 CAA Conformity Total	398.09	381.22	2,022.94	13.40	220.92

TABLE E-86. ANNUAL EMISSIONS FOR F/A-18E/F SQUADRON ACTIVITY, NAF EL CENTRO ALTERNATIVE

		ESTIMATED ANNUAL EMISSIONS, TONS PER YEAR				
YEAR	EMISSIONS COMPONENT	REACTIVE ORGANIC COMPOUNDS	NITROGEN OXIDES	CARBON MONOXIDE	SULFUR OXIDES	PM10
2010	Added E/F vs Replaced C/D Operations	365.27	341.05	1,562.65	11.23	183.83
	Added E/F vs replaced C/D Run-Ups	21.07	18.95	87.23	0.73	11.48
	Aircraft Refueling	1.15	0.00	0.00	0.00	0.00
	Aircraft Support Equipment	16.06	7.96	336.99	0.04	0.23
	Other Permit-Exempt Equipment	0.50	6.75	3.61	0.42	0.61
	On-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Added Base-Related Traffic	14.47	10.74	134.11	0.29	30.17
	2010 CAA Conformity Total	418.50	385.46	2,124.60	12.71	226.33
	Maximum CAA Conformity Analysis Emissions	418.50	385.46	2,124.60	13.58	226.33
	De Minimis Threshold	50.00	50.00	na	na	70.00
	Above De Minimis Level?	YES	YES	NO	NO	YES
	Emissions Growth Included in SIP	0.00	0.00	0.00	0.00	0.00
	Other Available Offsets	0.00	0.00	0.00	0.00	0.00
	Net Conformity Emissions Change	418.50	385.46	2,124.60	13.58	226.33
	Conformity Offset Requirements	418.50	385.46	na	na	226.33
2010	Base-Related CAA Conformity Analysis Emissions	418.50	385.46	2,124.60	12.71	226.33
	Engine Test Cell	7.00	44.77	159.79	0.81	4.91
	Other On-Base Permit Sources	3.04	0.52	0.39	0.00	0.13
	Off-Base Natural Gas Use	0.00	0.00	0.00	0.00	0.00
	Additional Household Travel	42.20	37.16	385.29	1.12	115.95
	Maximum Annual Total Emissions	470.75	467.91	2,670.08	14.64	347.32

TABLE E-86. ANNUAL EMISSIONS FOR F/A-18E/F SQUADRON ACTIVITY, NAF EL CENTRO ALTERNATIVE

Notes: na = not applicable; conformity requirements apply only to nonattainment pollutants.

Construction emission estimates for Phase 1 assume all aircraft-related facilities, one BEQ, the BOQ, and 100 units of family housing will be constructed in 1999. Other Phase 1 housing and personnel support facility construction is assumed to occur in stages during 2000-2002.

Construction emission estimates for Phase 2 assume that additional aircraft maintenance and training facilities plus 75 units of family housing will be constructed in 2005. Other equipment storage, warehousing, administrative offices, housing, and personnel support facilities are assumed to be constructed in stages between 2009.

Phase 1 analyses assume that 20 FRS aircraft will arrive in 2000 and 16 FRS aircraft will arrive in 2001; in addition, one fleet squadron will arrive each year from 2000 through 2003.

Phase 2 analyses assume that one fleet squadron will arrive each year from 2005 through 2010.

In-frame engine run-up emission estimates assume 57.4 low power run-ups (10 minutes) per aircraft per year plus 3.2 high power run-ups (28.5 minutes) per aircraft per year. Each run-up event tests a single engine.

Aircraft refueling emission estimates are based on 80% splash loading of aircraft fuel tanks at fuel pit facilities and 20% splash loading of fuel trucks with subsequent splash loading of aircraft; emission rates reflect monthly temperature patterns at NAF El Centro.

Aircraft support equipment includes tow tractors and weapons loaders.

Other permit-exempt equipment includes portable or stationary engines used for pumps, fans, compressors, generators, hoists, hydraulic test stands, air start units, etc.

On-base natural gas use includes space heating and water heating for residential, office, and industrial buildings that do not have central boilers large enough to require APCD permits. Emissions are less than 0.005 tons per year for any pollutant.

Base-related vehicle traffic includes only work-related trips (240 days per year).

Engine test cell emission estimates assume 4.77 single engine tests per aircraft per year, 53% schedule checks (14 minutes) and 47% break-in tests (84.5 minutes).

Other on-base permit sources include boilers in hangars and BEQs; paint, solvent, and abrasive blasting facilities; and the Navy exchange gas station.

Off-base natural gas use includes space heating and water heating for off-base housing.

Emissions are less than 0.005 tons per year for any pollutant.

Additional household vehicle travel is not related to on-base land uses, and includes all shopping and other trips.

Phase 1 vehicle travel emission estimates were calculated for 2003 conditions; intermediate year vehicle emissions were estimated as a percent of 2003 emissions: 50% for 1999 and 2000, 65% for 2001, and 80% for 2002.

Phase 2 vehicle travel emission estimates were calculated for 2010 conditions; intermediate year vehicle emissions were estimated as Phase 1 emissions plus one-sixth of the Phase 2 increment for each year between 2005 and 2010.

#### Data Sources:

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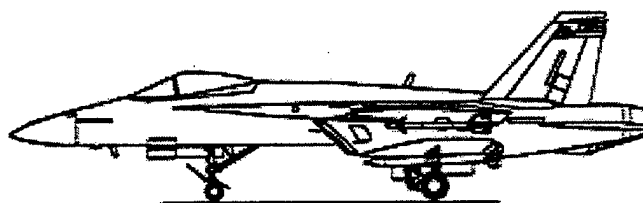
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TABLE E-86. ANNUAL EMISSIONS FOR F/A-18E/F SQUADRON ACTIVITY, NAF EL CENTRO ALTERNATIVE

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APPENDIX F  
NOISE

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# APPENDIX F

## NOISE

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### F.1 INTRODUCTION

Sound is caused by vibrations that generate waves of minute air pressure fluctuations in the air. Air pressure fluctuations that occur from 20 to 20,000 times per second can be detected as audible sound. The number of pressure fluctuations per second is normally reported as cycles per second or Hertz. Different vibrational frequencies produce different tonal qualities for the resulting sound.

Sound level meters typically report measurements as an overall decibel (dB) value. Decibel scales are a logarithmic index based on ratios between a measured value and a reference value. In the field of acoustics, decibel scales are based on ratios of the actual pressure fluctuations generated by sound waves compared to a standard reference pressure value of 20 micropascals.

Measurements and descriptions of sounds are usually based on various combinations of the following factors:

- The vibrational frequency characteristics of the sound, measured as sound wave cycles per second (Hertz); this determines the "pitch" of a sound;
- The total sound energy being radiated by a source, usually reported as a sound power level;
- The actual air pressure changes experienced at a particular location, usually measured as a sound pressure level; the frequency characteristics and sound pressure level combine to determine the "loudness" of a sound at a particular location;
- The duration of a sound; and

- The changes in frequency characteristics or pressure levels through time.

Modern sound level meters measure the actual air pressure fluctuations at a number of different frequency ranges, most often using octave or 1/3 octave intervals. The pressure measurements at each frequency interval are converted to a decibel index and adjusted for a selected frequency weighting system. The different adjusted decibel values for the octave or 1/3 octave bands are then combined into a composite sound pressure level for the appropriate decibel scale. Most sound level meters do not save or report the detailed frequency band pressure level measurements. A more sophisticated and expensive instrument (a spectrum analyzer) is required to obtain dB measurements for discrete frequency bands.

#### **F.1.1 General Purpose Decibel Scales**

Human hearing varies in sensitivity for different sound frequencies. The ear is most sensitive to sound frequencies between 800 and 8,000 Hertz, and is least sensitive to sound frequencies below 250 Hertz or above 16,000 Hertz. Consequently, several different frequency weighting schemes have been used to approximate the way the human ear responds to noise levels. The "A-weighted" decibel scale (dBA) is the most widely used for this purpose, with different dB adjustment values specified for each octave or 1/3 octave interval. The A-weighted scale significantly reduces the measured pressure level for low frequency sounds while slightly increasing the measured pressure level for some middle frequency sounds.

Other frequency weighting schemes are used for specialized purposes. The "C-weighted" decibel scale (dBC) is often used to characterize low frequency sounds capable of inducing vibrations in buildings or other structures. The C-weighted scale does not significantly reduce the measured pressure level for low frequency components of a sound.

Unweighted decibel measurements are frequently used for refined analyses that require data on the frequency spectrum of a sound (e.g., sound absorption or sound transmission properties of materials). Unweighted decibel measurements are sometimes termed flat or linear measurements or overall sound pressure levels.

Varying noise levels are often described in terms of the equivalent constant decibel level. Equivalent noise levels (Leq) are used to develop single-value descriptions of average noise exposure over various periods of time. Such average noise exposure ratings often include additional weighting factors for potential annoyance due to time of day or other considerations. The Leq data used for these average noise exposure descriptors are generally based on A-weighted sound level measurements.

Statistical descriptions ( $L_x$ , where  $x$  represents the percent of the time when noise levels exceed the specified decibel level) are also used to characterize noise conditions over specified periods of time.  $L_1$ ,  $L_5$ , and  $L_{10}$  descriptors are commonly used to characterize peak noise levels, while  $L_{90}$ ,  $L_{95}$ , and  $L_{99}$  descriptors are commonly used to characterize "background" noise levels. It should be noted that the  $L_{50}$  value (the sound level exceeded 50 percent of the time) will seldom be the same as the  $L_{eq}$  value for the period being analyzed. The  $L_{eq}$  value is often between the  $L_{30}$  and the  $L_{50}$  values for the measurement period.

### F.1.2 Decibel Scales Reflecting Annoyance Potential

Average noise exposure over a 24-hour period is often presented as a day-night average sound level ( $L_{dn}$ ).  $L_{dn}$  values are calculated from hourly  $L_{eq}$  values, with the  $L_{eq}$  values for the nighttime period (10 p.m. - 7 a.m.) increased by 10 dB to reflect the greater disturbance potential from nighttime noises.

The community noise equivalent level (CNEL) is also used to characterize average noise levels over a 24-hour period, with weighting factors for evening and nighttime noise levels.  $L_{eq}$  values for the evening period (7 p.m. - 10 p.m.) are increased by 5 dB while  $L_{eq}$  values for the nighttime period (10 p.m. - 7 a.m.) are increased by 10 dB. The CNEL value will be slightly higher than (but generally within 1 dB of) the  $L_{dn}$  value for the same set of noise measurements. Only in situations with high evening period noise levels will CNEL values be meaningfully different from  $L_{dn}$  values.

It should be noted that single-value average noise descriptors (such as  $L_{dn}$  or CNEL values) are most appropriately applied to variable but relatively continuous sources of noise. Typical urban noise conditions, highway traffic, and major commercial airports are examples where CNEL and  $L_{dn}$  descriptors are most appropriate.

### F.1.3 Noise Descriptors for Discrete Noise Events

The annoyance potential of intermittent or short-duration noise events can be difficult to evaluate from 24-hour average noise descriptors. Railroad operations, aircraft activity at general aviation airports, testing of emergency generators, pile driving, and blasting activities sometimes require evaluations using other types of noise descriptors. Peak noise levels, the duration of individual noise events, and the repetition pattern of events are often used to describe intermittent or short duration noise conditions. Statistical descriptions ( $L_x$  values) and event-specific  $L_{eq}$  values also can be used to characterize discrete noise events.

Impulse sounds usually are defined as noise events producing a significant increase in sound level but lasting less than two seconds (often less than one second). Examples of impulse noise sources include pile driving, punch presses, gunshots, fireworks, and blasting activities. Impulse noises are usually described using the sound exposure level (SEL) descriptor. The SEL measure represents the

cumulative (not average) sound exposure during a particular noise event, integrated with respect to a one-second time frame.

Individual noise events of greater duration sometimes are characterized using the single event noise exposure level (SENEL) descriptor. The SENEL of a noise event is calculated as the cumulative A-weighted sound exposure during a discrete noise event, integrated with respect to a one-second time frame.

Mathematically, the SEL and SENEL descriptors are the same (Peasons and Bennett 1974). SEL and SENEL measurements are equivalent to the Leq value of a one-second noise event producing the same cumulative acoustic energy as the actual noise event being analyzed. In effect, an SEL or SENEL measure "spreads" or "compresses" the noise event to fit a fixed one-second time interval. If the actual duration of the noise event is less than one second, the SEL or SENEL value will be less than the Leq value for the event. If the duration of the noise event exceeds one second, the SEL or SENEL value will exceed the Leq of the event.

In practice, the SENEL descriptor implies an A-weighted basis, while SEL descriptors often use other decibel weighting schemes. Impulse noises of substantial magnitude (e.g., blasting or sonic booms) often are characterized using unweighted (flat) or C-weighted SEL measures. Annoyance from such sources often involves induced structural vibrations as well as the loudness of the noise event. Unweighted and C-weighted decibel scales have proven more useful than the A-weighted scale for such evaluations. Less intense impulse noises often are characterized using an A-weighted SEL measure. In recent years, the SEL acronym has tended to replace the SENEL acronym in technical noise reports, regardless of the decibel weighting scheme being used.

Most SEL and SENEL measurements are performed using procedures that restrict the time interval over which actual measurements or subsequent calculations are made. Sometimes this involves defining the noise event as the period when sound levels exceed a particular threshold level. In other cases, the calculations are restricted to that portion of the noise event when sound levels are within a defined increment (generally 10 - 30 dB) of the peak sound level. The measurement restrictions noted above are done as a practical expediency to minimize manual computations, to accommodate monitoring instruments with a limited measurement range, or to systematically define discrete noise events against fluctuating background noise conditions.

If individual noise events are repeated frequently, it is possible to calculate Ldn or CNEL values based on typical SEL or SENEL values and the number and time of occurrence of the noise events. Such computation procedures often are used to evaluate airport noise.

## F.2 NOISE IMPACT CALCULATIONS FOR FLYOVER EVENTS

### F.2.1 Available Data

Most data on noise levels from military aircraft are presented as A-weighted SEL values at different slant distances from the flight path of an aircraft flying at low altitude. Noise monitoring is generally done for several power settings and air speeds. The reported SEL values are typically computed for the time interval when noise levels are within 10 dBA of the peak level. Data are available (U.S. Navy 1984) for many, but not all, of the aircraft types used by the Navy. The available F/A-18 noise data are for the A/B version of the aircraft; the C/D version of the F/A-18 would have nearly identical noise characteristics. Although available noise data are not specific to the E/F version, noise level differences between the aircraft versions are not expected to be significant.

### F.2.2 Technical Approach

While SEL data have their uses, a dBA time history profile provides a more understandable description of flyover event noise. A dBA time history also allows peak noise levels to be estimated and compared to other common noise sources and various impact significance criteria.

Developing dBA time histories from SEL data requires some basic assumptions. A fundamental assumption is that aircraft SEL data provide a robust estimate of total acoustic energy output for basic engine power settings. When that assumption is used, it is possible to synthesize an approximate time history of dBA levels that is consistent with the measured SEL data.

The aircraft flyover event noise level analyses presented in this EIS required several steps: estimating flyover event durations, simulating flyover event time histories for a standardized slant distance, calibrating measured SEL data to a simple distance attenuation model, and estimating peak flyover event dBA at various slant distances.

*Event Duration.* The synthesis of dBA time histories from SEL data requires an estimate of the duration of the noise event that was measured for the SEL data. The SEL data tables (U.S. Navy, 1984) indicate aircraft power setting, flight speed, and slant distance.

Preliminary analyses assume that aircraft can be heard above background noise from a distance of 2 nautical miles (2.3 statute miles). Flight speed then defines a nominal event duration. When flight speed is a significant fraction of the speed of sound, there will be only a brief time interval for the approach portion of the noise event (2 nautical miles at the speed of sound versus 2 nautical miles at flight speed). Consequently, the duration of the approach segment of the noise event requires adjustment for the time lag between the speed of sound and the speed of the aircraft. Speed of sound calculations incorporate temperature and relative humidity corrections (Weast 1980).

*Flyover Profile Simulation.* The flyover event simulation analysis uses event durations and peak noise levels to create a time history using generalized noise level rise and fall equations. The simulation procedure used for this EIS divides the overall event into 25 intervals. Peak noise conditions are assumed to last for 2 intervals. The placement of the peak intervals depends on approach lag time versus overall event duration.

Noise level changes from background to peak and then back down to background are simulated with simple mathematical formulations. Different types of curves are used for the approach segment depending on the type of aircraft. For military fighter aircraft, a reversed sine curve formulation is used to simulate the approach segment. The reversed sine curve formulation provides a steep noise level rise during the approach segment, but one that is less steep than that which would be generated by an exponential function. A logarithmic curve formulation is used to simulate the departure segment of the event.

With the event duration defined and appropriate curve types programmed, the peak dBA value is the only remaining factor needed to fully define the event profile. Peak dBA values are identified by iteration, matching the simulated event SEL to the measured SEL value.

For any basic power setting (takeoff, cruise, or approach power), the simulation can be repeated at various flight speeds. In each case, the SEL value used for calibration is assumed to be constant for a given power setting, regardless of air speed. Consequently, the only factors that vary are event duration (defined by air speed) and peak dBA (established by iteration and matching of the measured SEL value). Higher air speeds at a given power setting yield shorter event durations with higher peak dBA values.

*Distance Attenuation Calibration.* Measured SEL data at various slant distances (U.S. Navy 1984) were also used to calibrate a basic two-factor noise attenuation model. The noise attenuation model calculates noise levels at various distances on the basis of a geometric noise drop-off rate and a linear atmospheric absorption rate. Measured SEL data at various distances were used to estimate basic drop-off rates and atmospheric absorption factors.

*Modeled F/A-18 Peak Noise Level Versus Distance.* The final computation for the flyover event noise analysis applied the calibrated noise attenuation model to estimated peak dBA values for various F/A-18 power settings and air speeds.

### F.3 REFERENCES

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TABLE F-1 F/A-18 SEL CALIBRATION, APPROACH, 150 KNOTS, 86% RPM

==> Basic sound level drop-off rate: 5.30 dB/doubling  
 ==> Atmospheric absorption coefficient: 0.21 dB/100 meters  
 ==> Reference Noise Level: 118.8 SEL (dBA)  
 ==> Distance for Reference Noise Level: 315 Feet  
 deviation 200-8,000 ft: 0.04  
 deviation 10,000-25,000 ft: 0.06

DISTANCE ATTENUATION:

DISTANCE TO dB CONTOURS:

Receptor Distance (feet)	Noise Level (dBA) at Receptor	Target SEL	Noise Contour Value (dBA)	Contour Distance (feet)
200	122.3	122.1	105	1,681
250	120.6	120.4	100	3,027
315	118.8	118.8	95	4,919
400	116.9	117.1	90	7,768
500	115.1	115.3	85	15,548
630	113.3	113.6	80	23,347
800	111.4	111.7	75	31,151
1,000	109.5	109.9	70	38,959
1,250	107.7	107.9	65	40,677
1,600	105.6	105.9	60	42,470
2,000	103.6	103.8	55	44,343
2,500	101.6	101.6	50	46,299
3,150	99.4	99.3	45	48,340
4,000	97.0	96.8	40	50,472
5,000	94.7	94.3	35	52,697
6,300	92.1	91.5	30	55,021
8,000	89.1	88.6	25	57,284
10,000	86.2	85.5		
12,500	82.9	82.2		
16,000	78.7	78.6		
20,000	74.5	74.8		
25,000	69.6	70.6		

Notes: Drop-off calculations include atmospheric absorption at 0.21 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-2 F/A-18 SEL CALIBRATION, PATTERN, 200 KNOTS, 68% RPM

⇒ Basic sound level drop-off rate:	5.4 dB/doubling
⇒ Atmospheric absorption coefficient:	0.24 dB/100 meters
⇒ Reference Noise Level:	104.5 SEL (dBA)
⇒ Distance for Reference Noise Level:	315 Feet
deviation 200-8,000 ft:	0.76
deviation 10,000-25,000 ft:	-1.36

DISTANCE ATTENUATION:

Receptor Distance (feet)	Noise Level (dBA) at Receptor	Target SEL
200	108.1	107.8
250	106.3	106.2
315	104.5	104.5
400	102.6	102.9
500	100.8	101.1
630	98.9	99.3
800	96.9	97.4
1,000	95.0	95.5
1,250	93.1	93.4
1,600	90.9	91.3
2,000	88.9	89.0
2,500	86.8	86.7
3,150	84.5	84.2
4,000	82.0	81.6
5,000	79.5	78.8
6,300	76.8	75.9
8,000	73.7	72.8
10,000	70.5	69.6
12,500	66.9	66.1
16,000	62.4	62.5
20,000	57.8	58.6
25,000	52.4	54.5

DISTANCE TO dB CONTOURS:

Noise Contour Value (dBA)	Contour Distance (feet)
105	295
100	548
95	1,000
90	1,726
85	3,055
80	4,898
75	7,678
70	14,476
65	21,295
60	28,121
55	34,950
50	36,449
45	38,013
40	39,643
35	41,343
30	43,116
25	44,875

Notes: Drop-off calculations include atmospheric absorption at 0.24 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-3 F/A-18 SEL CALIBRATION, TAKEOFF, 300 KNOTS, 101% RPM

==> Basic sound level drop-off rate: 5.8 dB/doubling  
 ==> Atmospheric absorption coefficient: 0.2 dB/100 meters  
 ==> Reference Noise Level: 125.2 SEL (dBA)  
 ==> Distance for Reference Noise Level: 315 Feet  
 deviation 200-8,000 ft: 1.44  
 deviation 10,000-25,000 ft: -1.18

DISTANCE ATTENUATION:			DISTANCE TO dB CONTOURS:	
Receptor Distance (feet)	Noise Level (dBA) at Receptor	Target SEL	Noise Contour Value (dBA)	Contour Distance (feet)
200	129.1	129.2	105	2,996
250	127.2	127.2	100	4,814
315	125.2	125.2	95	6,698
400	123.1	123.1	90	15,711
500	121.2	121.1	85	23,885
630	119.2	119.1	80	32,072
800	117.1	117.1	75	40,264
1,000	115.1	115.1	70	42,045
1,250	113.1	113.0	65	43,904
1,600	110.8	110.9	60	45,845
2,000	108.7	108.7	55	47,872
2,500	106.5	106.4	50	49,988
3,150	104.2	104.1	45	52,198
4,000	101.7	101.6	40	54,506
5,000	99.2	98.9	35	56,916
6,300	96.5	96.1	30	59,432
8,000	93.4	93.2	25	61,874
10,000	90.4	90.0		
12,500	87.0	86.6		
16,000	82.8	82.9		
20,000	78.5	79.0		
25,000	73.6	74.8		

Notes: Drop-off calculations include atmospheric absorption at 0.2 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-4 F/A-18 SEL CALIBRATION.AFTERBURNER, 350 KNOTS

=> Basic sound level drop-off rate: 6.56 dB/doubling  
 => Atmospheric absorption coefficient: 0.1 dB/100 meters  
 => Reference Noise Level: 130.8 SEL (dBA)  
 => Distance for Reference Noise Level: 315 Feet  
 deviation 200-8,000 ft: 3.72  
 deviation 10,000-25,000 ft: 0.51

DISTANCE ATTENUATION:

Receptor Distance (feet)	Noise Level (dBA) at Receptor	Target SEL
200	135.1	135.8
250	133.0	133.4
315	130.8	130.8
400	128.5	128.2
500	126.4	125.6
630	124.1	123.1
800	121.8	120.8
1,000	119.7	118.7
1,250	117.5	116.6
1,600	115.0	114.5
2,000	112.8	112.5
2,500	110.5	110.3
3,150	108.1	108.2
4,000	105.6	105.9
5,000	103.2	103.5
6,300	100.6	100.9
8,000	97.8	98.2
10,000	95.1	95.3
12,500	92.2	92.2
16,000	88.8	88.9
20,000	85.5	85.3
25,000	81.9	81.4

DISTANCE TO dB CONTOURS:

Noise Contour Value (dBA)	Contour Distance (feet)
105	4,178
100	6,530
95	23,165
90	39,437
85	55,777
80	72,142
75	75,610
70	79,244
65	83,054
60	87,046
55	91,230
50	95,616
45	100,212
40	105,029
35	110,078
30	115,369
25	120,681

Notes: Drop-off calculations include atmospheric absorption at 0.1 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-5 FLYOVER EVENT DURATION CALCULATIONS

AIR SPEED (KNOTS)	SPEED (MPH)	% SPEED OF SOUND	2 NM APPROACH TIME	2 NM DEPARTURE TIME	4 NM TOTAL TIME
125	144	18.7%	46.8	57.6	104.4
150	173	22.5%	37.2	48.0	85.2
175	201	26.2%	30.3	41.1	71.5
200	230	30.0%	25.2	36.0	61.2
225	259	33.7%	21.2	32.0	53.2
250	288	37.5%	18.0	28.8	46.8
275	316	41.2%	15.4	26.2	41.6
300	345	45.0%	13.2	24.0	37.2
325	374	48.7%	11.4	22.2	33.5
350	403	52.5%	9.8	20.6	30.3
375	432	56.2%	8.4	19.2	27.6
400	460	60.0%	7.2	18.0	25.2
425	489	63.7%	6.1	16.9	23.1
450	518	67.5%	5.2	16.0	21.2
475	547	71.2%	4.4	15.2	19.5
500	575	75.0%	3.6	14.4	18.0

Note: Approach time is the difference in arrival times for sound versus the aircraft, based on the selected audible approach distance and aircraft flight speed.

The speed of sound is calculated for:

65 degrees Fahrenheit  
80% relative humidity

TABLE F-6 F/A-18 FLYOVER SIMULATION, APPROACH AT 150 KNOTS

INPUT=> PEAK dB = 106.89 dBA 315 FT SLANT DIST.  
 INPUT=> EVENT DURATION = 85.20 seconds (4 NM) 173 MPH  
 INPUT=> BACKGROUND dB = 50.00 dBA 150 KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
50.58	114263	2	0.58	1	3.4
52.30	169998	3	1.73	2	6.8
55.14	326666	4	2.84	3	10.2
59.03	800034	5	3.89	4	13.6
63.90	2452114	6	4.86	5	17.0
69.63	9193847	7	5.74	6	20.4
76.13	41048226	8	6.50	7	23.9
83.26	211691778	9	7.12	8	27.3
90.86	1219617042	10	7.61	9	30.7
98.79	7574795021	11	7.93	10	34.1
106.89	48865235934	12	8.10	11	37.5
106.89	48865235934	13	0.00	12	40.9
106.89	48865235934	14	0.00	13	44.3
104.96	31360307868	15	-1.93	14	47.7
102.87	19384931397	16	-2.09	15	51.1
100.59	11461392505	17	-2.28	16	54.5
98.08	6423367199	18	-2.51	17	57.9
95.28	3371020695	19	-2.80	18	61.3
92.12	1629008463	20	-3.16	19	64.8
88.50	707473122	21	-3.62	20	68.2
84.25	266145600	22	-4.25	21	71.6
79.12	81677877	23	-5.13	22	75.0
72.64	18360340	24	-6.48	23	78.4
63.83	2413479	25	-8.81	24	81.8
50.00	100000	26	-13.83	25	85.2

SEL = 118.78 dBA ERROR CHECK:  
 Leq(event) = 99.47 dBA INITIAL dB = 50.00  
 L(max) = 106.89 dBA FINAL dB = 50.00  
 PEAK - SEL = -11.89 dBA  
 PEAK - Leq = 7.42 dBA NOISE RISE: REVERSED SINE CURVE  
 SEL - Leq = 19.30 dBA NOISE DECAY: DECLINING LOG CURVE  
  
 SEL delta10 = 118.80 dBA  
  
 Event Rate = 1.0 per hour  
 Leq(1 hr) = 83.22 dBA

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

APPROACH POWER, 150 KNOTS, 315 FEET

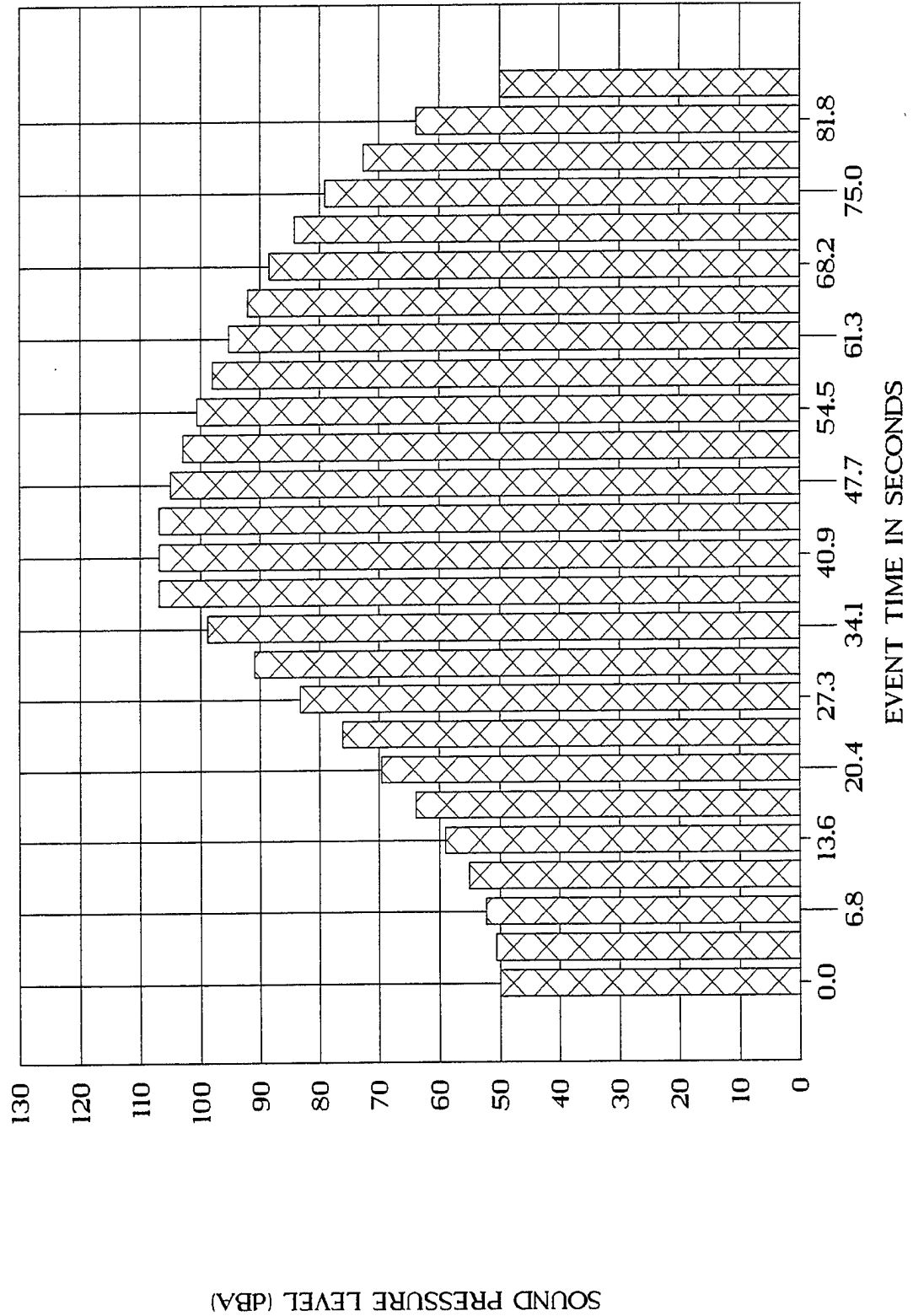


TABLE F-7 F/A-18 FLYOVER SIMULATION, APPROACH AT 200 KNOTS

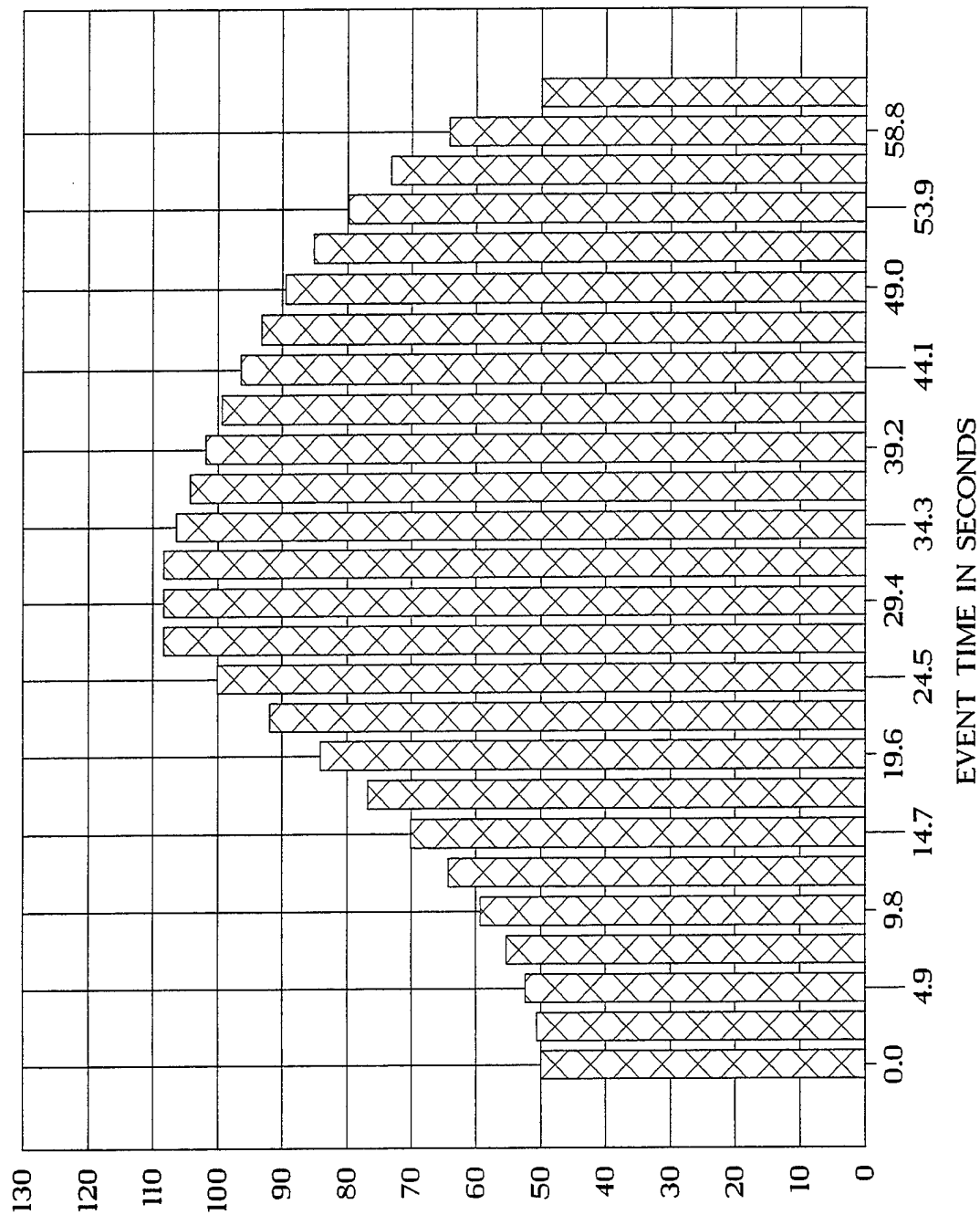
INPUT=>	PEAK dB =	108.36 dBA	315	FT SLANT DIST.
INPUT=>	EVENT DURATION =	61.20 seconds (4 NM)	230	MPH
INPUT=>	BACKGROUND dB =	50.00 dBA	200	KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
50.59	114657	2	0.59	1	2.4
52.36	172345	3	1.77	2	4.9
55.27	336812	4	2.91	3	7.3
59.26	844198	5	3.99	4	9.8
64.25	2663456	6	4.99	5	12.2
70.14	10333151	7	5.89	6	14.7
76.81	47953487	8	6.67	7	17.1
84.12	258010859	9	7.31	8	19.6
91.92	1555280756	10	7.80	9	22.0
100.05	10126295669	11	8.14	10	24.5
108.36	68548822645	12	8.31	11	26.9
108.36	68548822645	13	0.00	12	29.4
108.36	68548822645	14	0.00	13	31.8
106.38	43491376398	15	-1.98	14	34.3
104.24	26551487120	16	-2.14	15	36.7
101.90	15486908620	17	-2.34	16	39.2
99.32	8550512801	18	-2.58	17	41.6
96.45	4413222069	19	-2.87	18	44.1
93.21	2092939410	20	-3.24	19	46.5
89.49	889577738	21	-3.72	20	49.0
85.14	326303783	22	-4.36	21	51.4
79.87	97129532	23	-5.26	22	53.9
73.22	21007670	24	-6.65	23	56.3
64.18	2620415	25	-9.04	24	58.8
50.00	100000	26	-14.18	25	61.2

SEL =	118.76 dBA	ERROR CHECK:	
Leq(event) =	100.90 dBA	INITIAL dB =	50.00
L(max) =	108.36 dBA	FINAL dB =	50.00
PEAK - SEL =	-10.40 dBA		
PEAK - Leq =	7.46 dBA	NOISE RISE:	REVERSED SINE CURVE
SEL - Leq =	17.87 dBA	NOISE DECAY:	DECLINING LOG CURVE
SEL delta10 =	118.80 dBA		
Event Rate =	1.0 per hour		
Leq(1 hr) =	83.20 dBA		

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

APPROACH POWER, 200 KNOTS, 315 FEET



SOUND PRESSURE LEVEL (dBA)

TABLE F-8 F/A-18 FLYOVER SIMULATION, CRUISE POWER, 200 KNOTS

INPUT=> PEAK dB = 93.43 dBA 315 FT SLANT DIST.  
 INPUT=> EVENT DURATION = 61.20 seconds (4 NM) 230 MPH  
 INPUT=> BACKGROUND dB = 50.00 dBA 200 KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
50.53	113102	2	0.53	1	2.4
52.13	163140	3	1.59	2	4.9
54.73	297412	4	2.61	3	7.3
58.29	675211	5	3.56	4	9.8
62.72	1870834	6	4.43	5	12.2
67.90	6169481	7	5.18	6	14.7
73.71	23513607	8	5.81	7	17.1
80.01	100216491	9	6.30	8	19.6
86.64	460898313	10	6.63	9	22.0
93.43	2202926463	11	6.79	10	24.5
93.43	2202926463	12	0.00	11	26.9
93.43	2202926463	13	0.00	12	29.4
92.08	1613172776	14	-1.35	13	31.8
90.62	1153182102	15	-1.46	14	34.3
89.04	801486272	16	-1.58	15	36.7
87.31	538813277	17	-1.72	16	39.2
85.42	348024978	18	-1.90	17	41.6
83.31	214051094	19	-2.11	18	44.1
80.93	123818885	20	-2.38	19	46.5
78.21	66177719	21	-2.72	20	49.0
75.03	31817467	22	-3.18	21	51.4
71.20	13179246	23	-3.83	22	53.9
66.39	4356401	24	-4.81	23	56.3
59.92	982394	25	-6.47	24	58.8
50.00	100000	26	-9.92	25	61.2

SEL =	104.55 dBA	ERROR CHECK:	
Leq(event) =	86.68 dBA	INITIAL dB =	50.00
L(max) =	93.43 dBA	FINAL dB =	50.00
PEAK - SEL =	-11.12 dBA		
PEAK - Leq =	6.75 dBA	NOISE RISE:	REVERSED SINE CURVE
SEL - Leq =	17.87 dBA	NOISE DECAY:	DECLINING LOG CURVE
SEL delta10 =	104.50 dBA		
Event Rate =	1.0 per hour		
Leq(1 hr) =	69.04 dBA		

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

CRUISE POWER, 200 KNOTS, 315 FEET

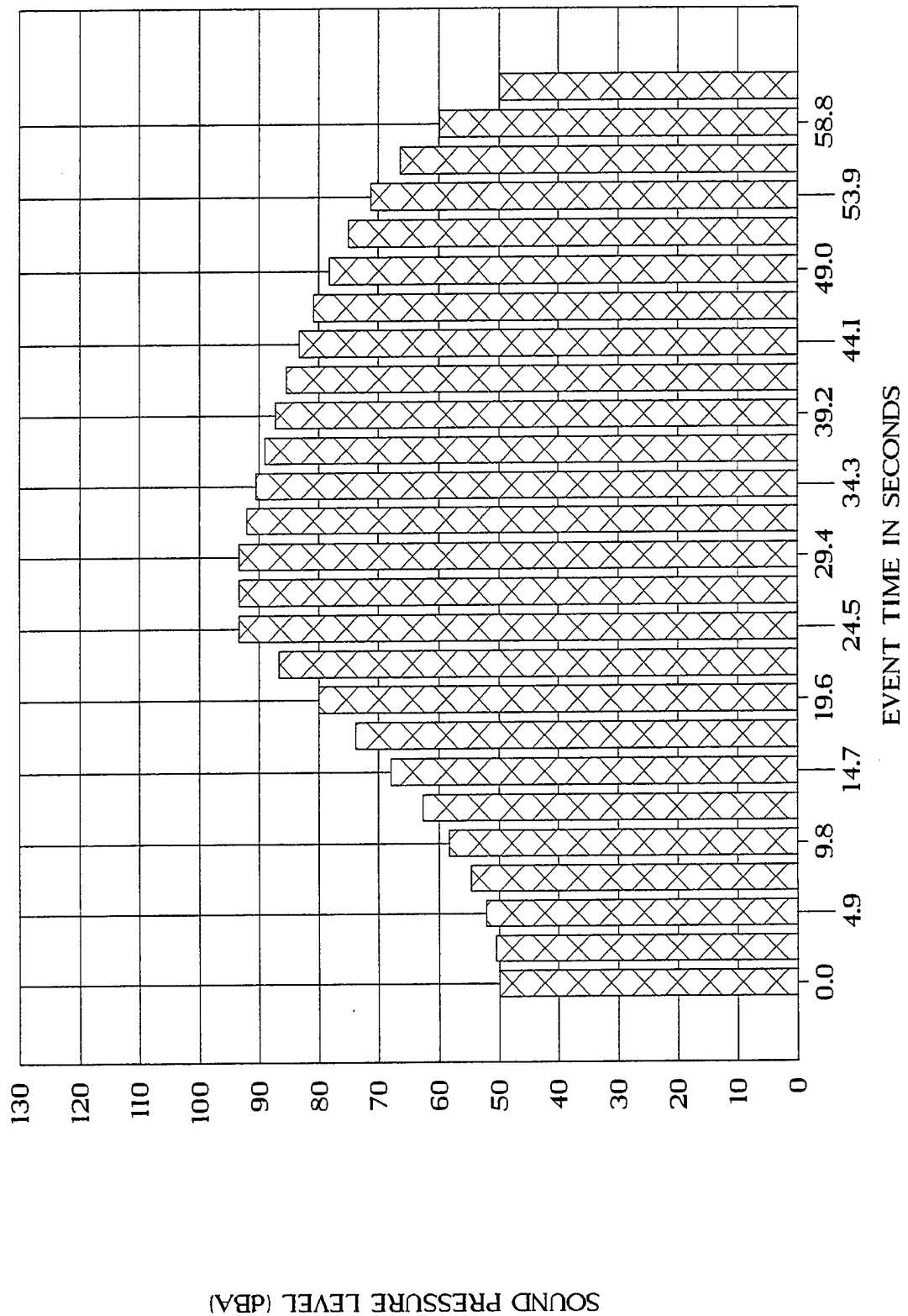


TABLE F-9 F/A-18 FLYOVER SIMULATION, CRUISE POWER, 250 KNOTS

INPUT=> PEAK dB = 94.63 dBA 315 FT SLANT DIST.  
 INPUT=> EVENT DURATION = 46.80 seconds (4 NM) 288 MPH  
 INPUT=> BACKGROUND dB = 50.00 dBA 250 KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
50.55	113487	2	0.55	1	1.9
52.18	165362	3	1.63	2	3.7
54.86	306505	4	2.68	3	5.6
58.52	711799	5	3.66	4	7.5
63.07	2028535	6	4.55	5	9.4
68.40	6913762	7	5.33	6	11.2
74.37	27342637	8	5.97	7	13.1
80.84	121298981	9	6.47	8	15.0
87.65	581879400	10	6.81	9	16.8
94.63	2904022654	11	6.98	10	18.7
94.63	2904022654	12	0.00	11	20.6
94.63	2904022654	13	0.00	12	22.5
93.24	2108346204	14	-1.39	13	24.3
91.74	1493244259	15	-1.50	14	26.2
90.12	1027456284	16	-1.62	15	28.1
88.35	683188314	17	-1.77	16	30.0
86.39	435980921	18	-1.95	17	31.8
84.23	264570782	19	-2.17	18	33.7
81.78	150744912	20	-2.44	19	35.6
78.99	79186282	21	-2.80	20	37.4
75.72	37309199	22	-3.27	21	39.3
71.78	15082195	23	-3.93	22	41.2
66.84	4835240	24	-4.94	23	43.1
60.20	1046413	25	-6.65	24	44.9
50.00	100000	26	-10.20	25	46.8

SEL = 104.53 dBA ERROR CHECK:  
 Leq(event) = 87.82 dBA INITIAL dB = 50.00  
 L(max) = 94.63 dBA FINAL dB = 50.00  
 PEAK - SEL = -9.90 dBA  
 PEAK - Leq = 6.81 dBA NOISE RISE: REVERSED SINE CURVE  
 SEL - Leq = 16.70 dBA NOISE DECAY: DECLINING LOG CURVE  
  
 SEL delta10 = 104.50 dBA  
  
 Event Rate = 1.0 per hour  
 Leq(1 hr) = 69.02 dBA

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

CRUISE POWER, 250 KNOTS, 315 FEET

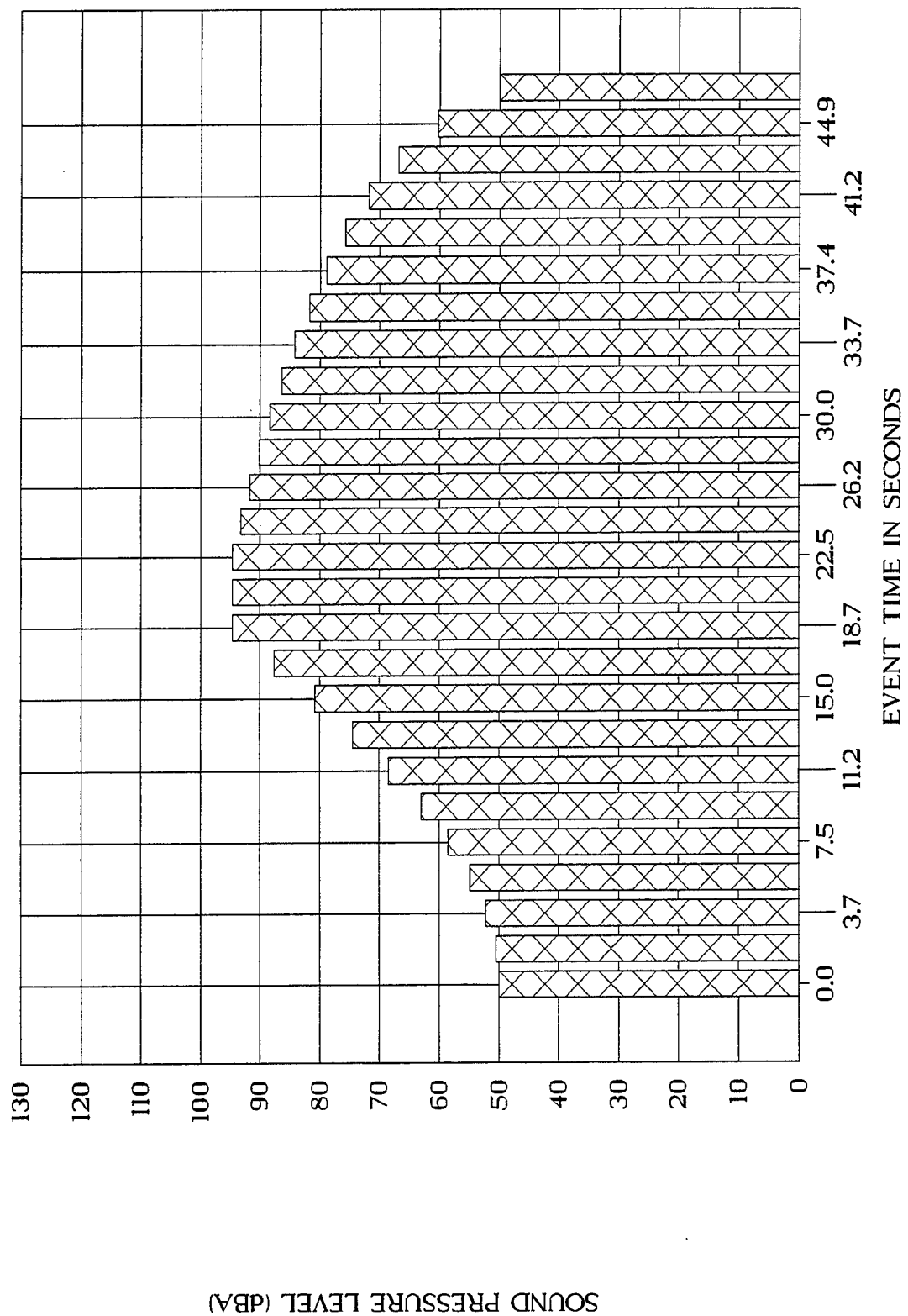


TABLE F-10 F/A-18 FLYOVER SIMULATION, CRUISE POWER, 300 KNOTS

INPUT=>	PEAK dB =	95.49 dBA	315	FT SLANT DIST.
INPUT=>	EVENT DURATION =	37.20 seconds (4 NM)	345	MPH
INPUT=>	BACKGROUND dB =	50.00 dBA	300	KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
50.69	117249	2	0.69	1	1.5
52.74	188078	3	2.05	2	3.0
56.09	406865	4	3.35	3	4.5
60.64	1159482	5	4.55	4	6.0
66.25	4216569	6	5.61	5	7.4
72.74	18814817	7	6.50	6	8.9
79.93	98435186	8	7.19	7	10.4
87.59	574214876	9	7.66	8	11.9
95.49	3539973411	10	7.90	9	13.4
95.49	3539973411	11	0.00	10	14.9
95.49	3539973411	12	0.00	11	16.4
94.18	2616559950	13	-1.31	12	17.9
92.77	1892842312	14	-1.41	13	19.3
91.26	1335726078	15	-1.51	14	20.8
89.62	915689483	16	-1.64	15	22.3
87.83	606636093	17	-1.79	16	23.8
85.86	385742082	18	-1.97	17	25.3
83.68	233297387	19	-2.18	18	26.8
81.22	132539891	20	-2.46	19	28.3
78.42	69481529	21	-2.80	20	29.8
75.15	32724884	22	-3.27	21	31.2
71.23	13268363	23	-3.92	22	32.7
66.33	4297252	24	-4.90	23	34.2
59.81	956673	25	-6.52	24	35.7
50.00	100000	26	-9.81	25	37.2

SEL =	104.47 dBA	ERROR CHECK:	
Leq(event) =	88.76 dBA	INITIAL dB =	50.00
L(max) =	95.49 dBA	FINAL dB =	50.00
PEAK - SEL =	-8.98 dBA		
PEAK - Leq =	6.73 dBA	NOISE RISE:	REVERSED SINE CURVE
SEL - Leq =	15.71 dBA	NOISE DECAY:	DECLINING LOG CURVE
SEL delta10 =	104.50 dBA		
Event Rate =	1.0 per hour		
Leq(1 hr) =	68.96 dBA		

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

CRUISE POWER, 300 KNOTS, 315 FEET

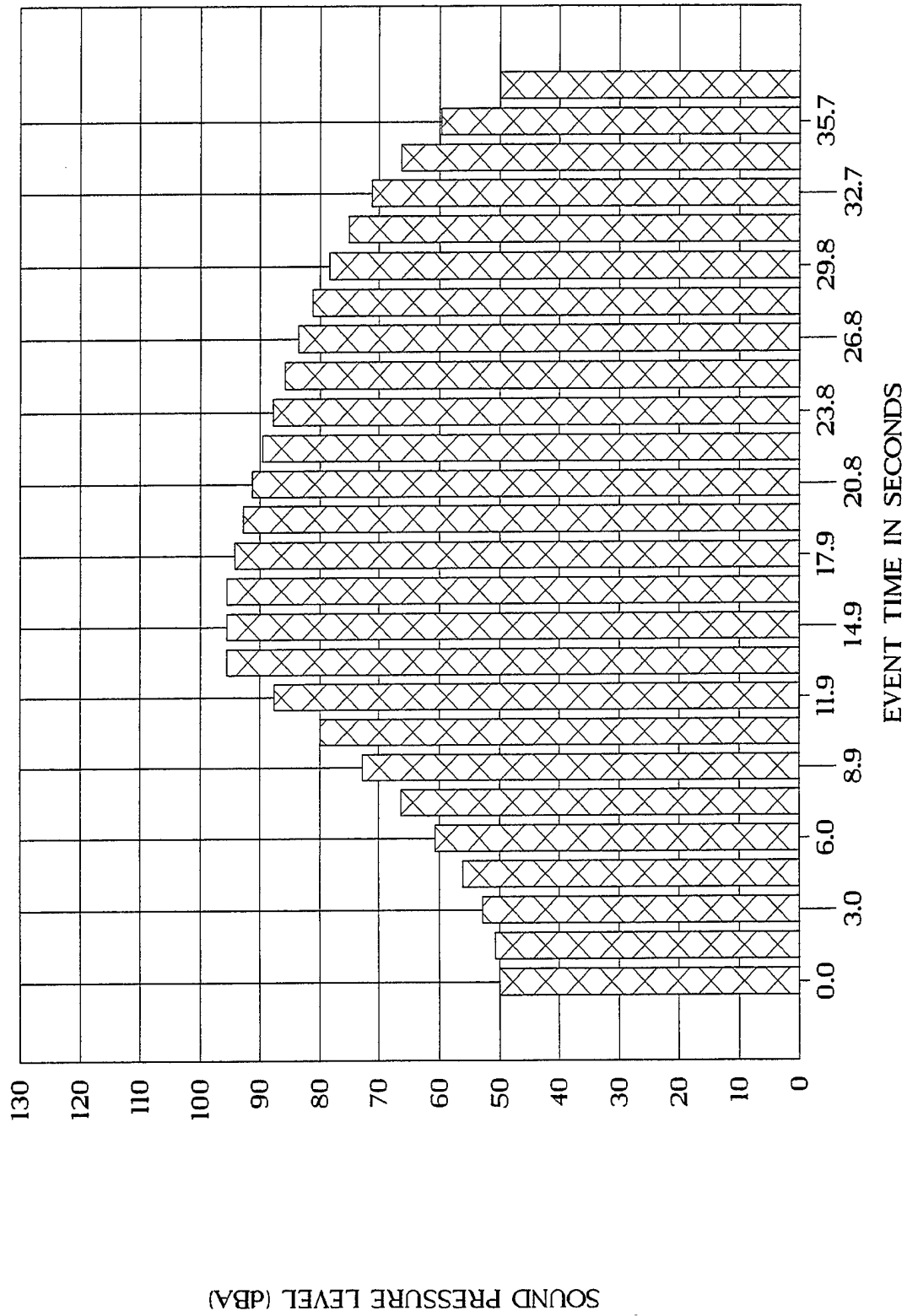


TABLE F-11 F/A-18 FLYOVER SIMULATION, TAKEOFF POWER, 150 KNOTS

INPUT=>	PEAK dB =	113.45 dBA	315	FT SLANT DIST.
INPUT=>	EVENT DURATION =	85.20 seconds (4 NM)	173	MPH
INPUT=>	BACKGROUND dB =	50.00 dBA	150	KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
50.65	116033	2	0.65	1	3.4
52.57	180725	3	1.92	2	6.8
55.73	374442	4	3.16	3	10.2
60.07	1016825	5	4.34	4	13.6
65.50	3546247	6	5.43	5	17.0
71.90	15484908	7	6.40	6	20.4
79.15	82155003	8	7.25	7	23.9
87.09	511907795	9	7.95	8	27.3
95.57	3609166577	10	8.48	9	30.7
104.42	27670203372	11	8.85	10	34.1
113.45	221309470961	12	9.03	11	37.5
113.45	221309470961	13	0.00	12	40.9
113.45	221309470961	14	0.00	13	44.3
111.30	134948883021	15	-2.15	14	47.7
108.97	78915640126	16	-2.33	15	51.1
106.43	43915648709	17	-2.55	16	54.5
103.62	23022212800	18	-2.80	17	57.9
100.50	11216534850	19	-3.12	18	61.3
96.98	4984266610	20	-3.52	19	64.8
92.94	1966169492	21	-4.04	20	68.2
88.20	660800929	22	-4.74	21	71.6
82.48	176970112	23	-5.72	22	75.0
75.25	33491096	24	-7.23	23	78.4
65.42	3483986	25	-9.83	24	81.8
50.00	100000	26	-15.42	25	85.2

SEL =	125.14 dBA	ERROR CHECK:	
Leq(event) =	105.83 dBA	INITIAL dB =	50.00
L(max) =	113.45 dBA	FINAL dB =	50.00
PEAK - SEL =	-11.69 dBA		
PEAK - Leq =	7.62 dBA	NOISE RISE:	REVERSED SINE CURVE
SEL - Leq =	19.30 dBA	NOISE DECAY:	DECLINING LOG CURVE
SEL delta10 =	125.20 dBA		
Event Rate =	1.0 per hour		
Leq(1 hr) =	89.57 dBA		

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

TAKEOFF POWER, 150 KNOTS, 315 FEET

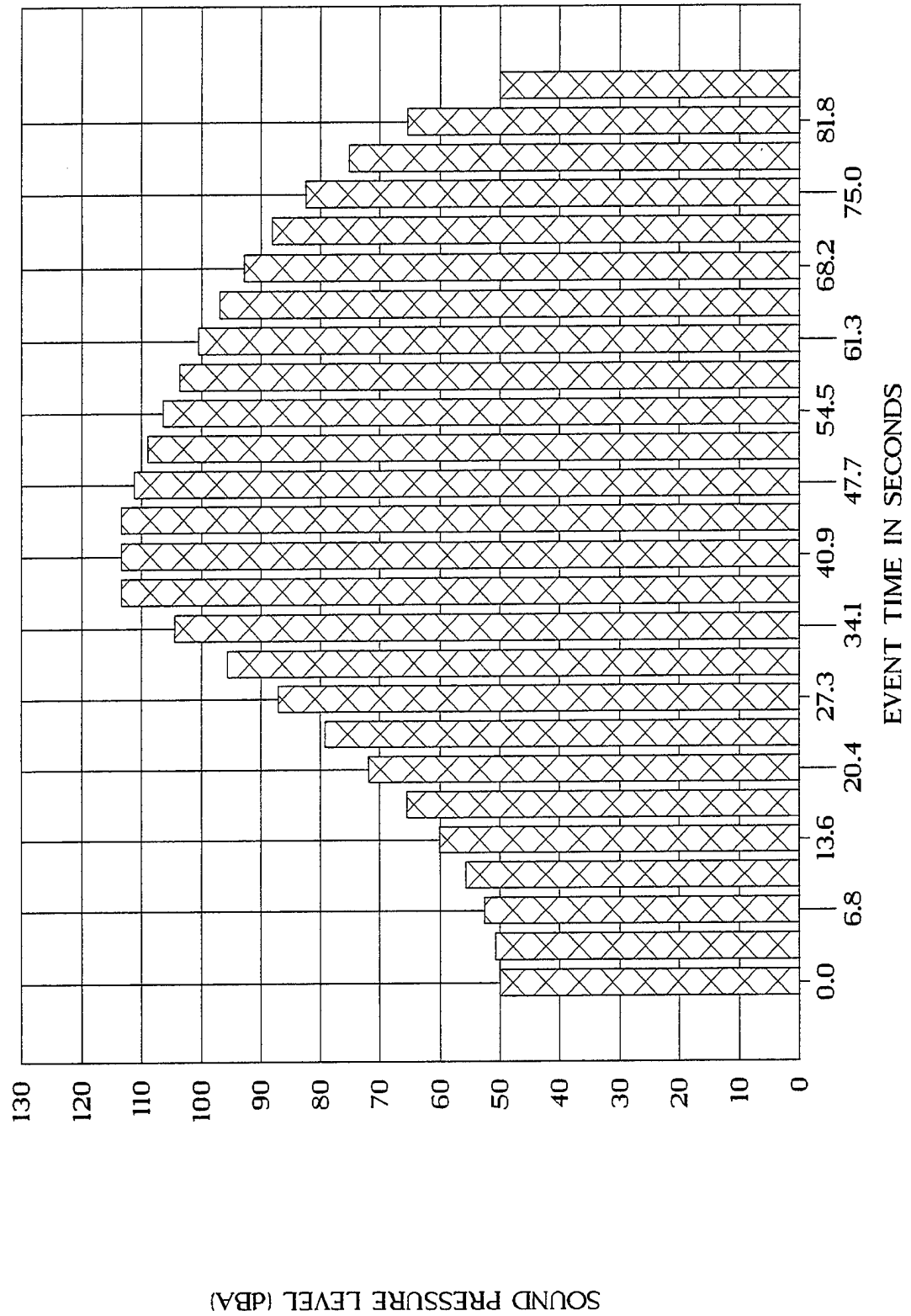


TABLE F-12 F/A-18 FLYOVER SIMULATION, TAKEOFF POWER, 175 KNOTS

INPUT=> PEAK dB = 114.23 dBA 315 FT SLANT DIST.  
 INPUT=> EVENT DURATION = 71.50 seconds (4 NM) 201 MPH  
 INPUT=> BACKGROUND dB = 50.00 dBA 175 KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
50.65	116246	2	0.65	1	2.9
52.60	182044	3	1.95	2	5.7
55.80	380569	4	3.20	3	8.6
60.20	1046233	5	4.39	4	11.4
65.69	3705275	6	5.49	5	14.3
72.17	16475155	7	6.48	6	17.2
79.50	89220372	8	7.34	7	20.0
87.55	568577110	9	8.04	8	22.9
96.13	4106121419	10	8.59	9	25.7
105.09	32278384736	11	8.95	10	28.6
114.23	264850013861	12	9.14	11	31.5
114.23	264850013861	13	0.00	12	34.3
114.23	264850013861	14	0.00	13	37.2
112.06	160519703691	15	-2.17	14	40.0
109.70	93251915154	16	-2.36	15	42.9
107.12	51521065401	17	-2.58	16	45.8
104.28	26795675576	18	-2.84	17	48.6
101.12	12940091623	19	-3.16	18	51.5
97.55	5693109731	20	-3.57	19	54.3
93.46	2220256012	21	-4.09	20	57.2
88.67	736260200	22	-4.79	21	60.1
82.88	194011211	23	-5.79	22	62.9
75.56	35972339	24	-7.32	23	65.8
65.61	3639430	25	-9.95	24	68.6
50.00	100000	26	-15.61	25	71.5

SEL = 125.13 dBA ERROR CHECK:  
 Leq(event) = 106.59 dBA INITIAL dB = 50.00  
 L(max) = 114.23 dBA FINAL dB = 50.00  
 PEAK - SEL = -10.90 dBA NOISE RISE: REVERSED SINE CURVE  
 PEAK - Leq = 7.64 dBA NOISE DECAY: DECLINING LOG CURVE  
 SEL - Leq = 18.54 dBA  
 SEL delta10 = 125.20 dBA  
 Event Rate = 1.0 per hour  
 Leq(1 hr) = 89.57 dBA

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

TAKEOFF POWER, 175 KNOTS, 315 FEET

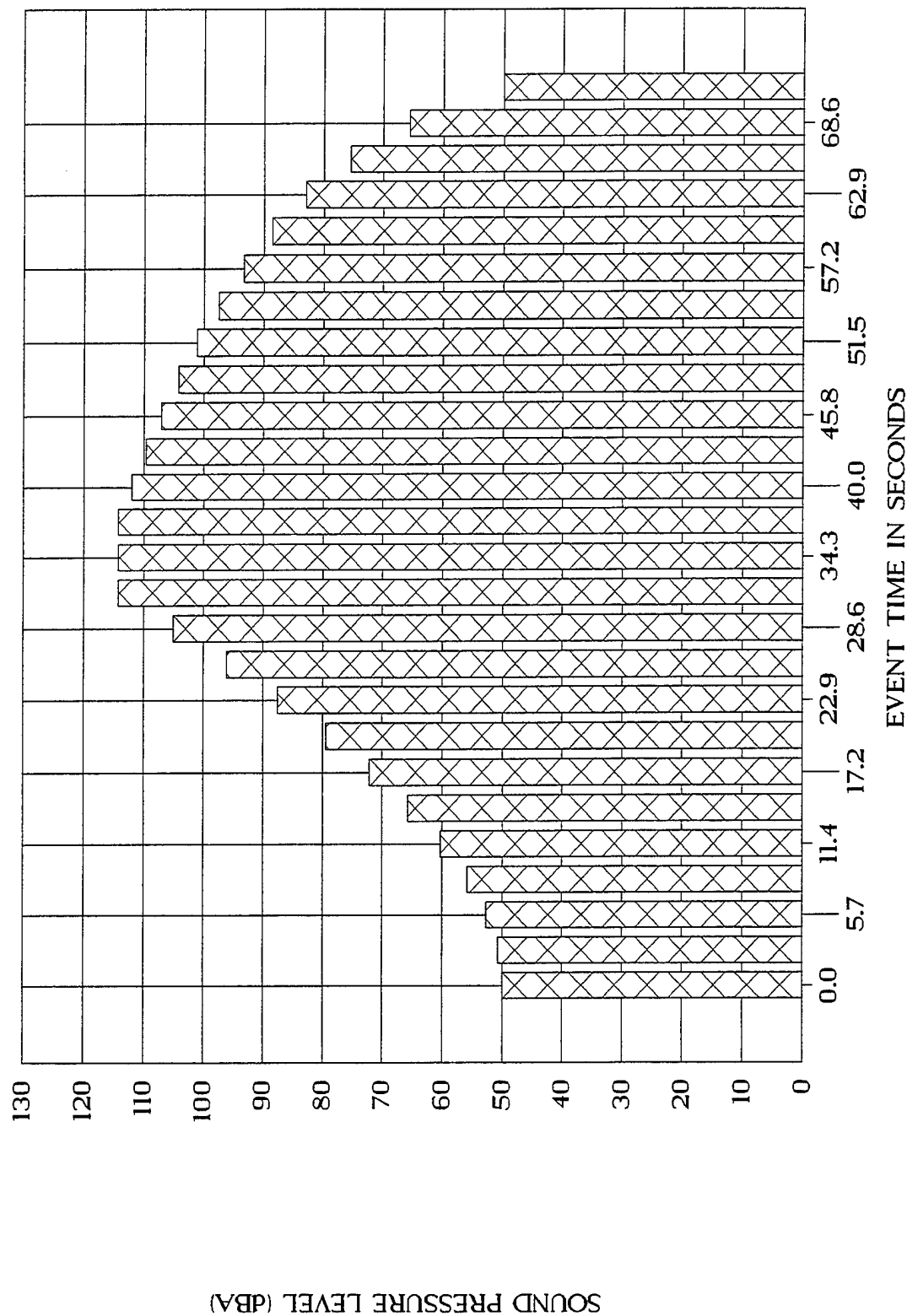


TABLE F-13 F/A-18 FLYOVER SIMULATION, TAKEOFF POWER, 200 KNOTS

INPUT=>	PEAK dB =	114.93 dBA	315	FT SLANT DIST.
INPUT=>	EVENT DURATION =	61.20 seconds (4 NM)	230	MPH
INPUT=>	BACKGROUND dB =	50.00 dBA	200	KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
50.80	120210	2	0.80	1	2.4
53.18	207869	3	2.38	2	4.9
57.08	510146	4	3.90	3	7.3
62.40	1738012	5	5.32	4	9.8
69.02	7975459	6	6.62	5	12.2
76.77	47479961	7	7.75	6	14.7
85.45	350945506	8	8.69	7	17.1
94.87	3065862374	9	9.41	8	19.6
104.77	30010347099	10	9.91	9	22.0
114.93	311171633711	11	10.16	10	24.5
114.93	311171633711	12	0.00	11	26.9
114.93	311171633711	13	0.00	12	29.4
112.91	195295044267	14	-2.02	13	31.8
110.73	118232925220	15	-2.18	14	34.3
108.37	68630618612	16	-2.36	15	36.7
105.79	37903993325	17	-2.58	16	39.2
102.95	19718909696	18	-2.84	17	41.6
99.79	9534292429	19	-3.16	18	44.1
96.24	4206002315	20	-3.55	19	46.5
92.17	1648556271	21	-4.07	20	49.0
87.42	551580572	22	-4.75	21	51.4
81.69	147686683	23	-5.72	22	53.9
74.51	28221318	24	-7.19	23	56.3
64.84	3044502	25	-9.67	24	58.8
50.00	100000	26	-14.84	25	61.2

SEL =	125.25 dBA	ERROR CHECK:	
Leq(event) =	107.38 dBA	INITIAL dB =	50.00
L(max) =	114.93 dBA	FINAL dB =	50.00
PEAK - SEL =	-10.32 dBA		
PEAK - Leq =	7.55 dBA	NOISE RISE:	REVERSED SINE CURVE
SEL - Leq =	17.87 dBA	NOISE DECAY:	DECLINING LOG CURVE
SEL delta10 =	125.20 dBA		
Event Rate =	1.0 per hour		
Leq(1 hr) =	89.69 dBA		

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

TAKEOFF POWER, 200 KNOTS, 315 FEET

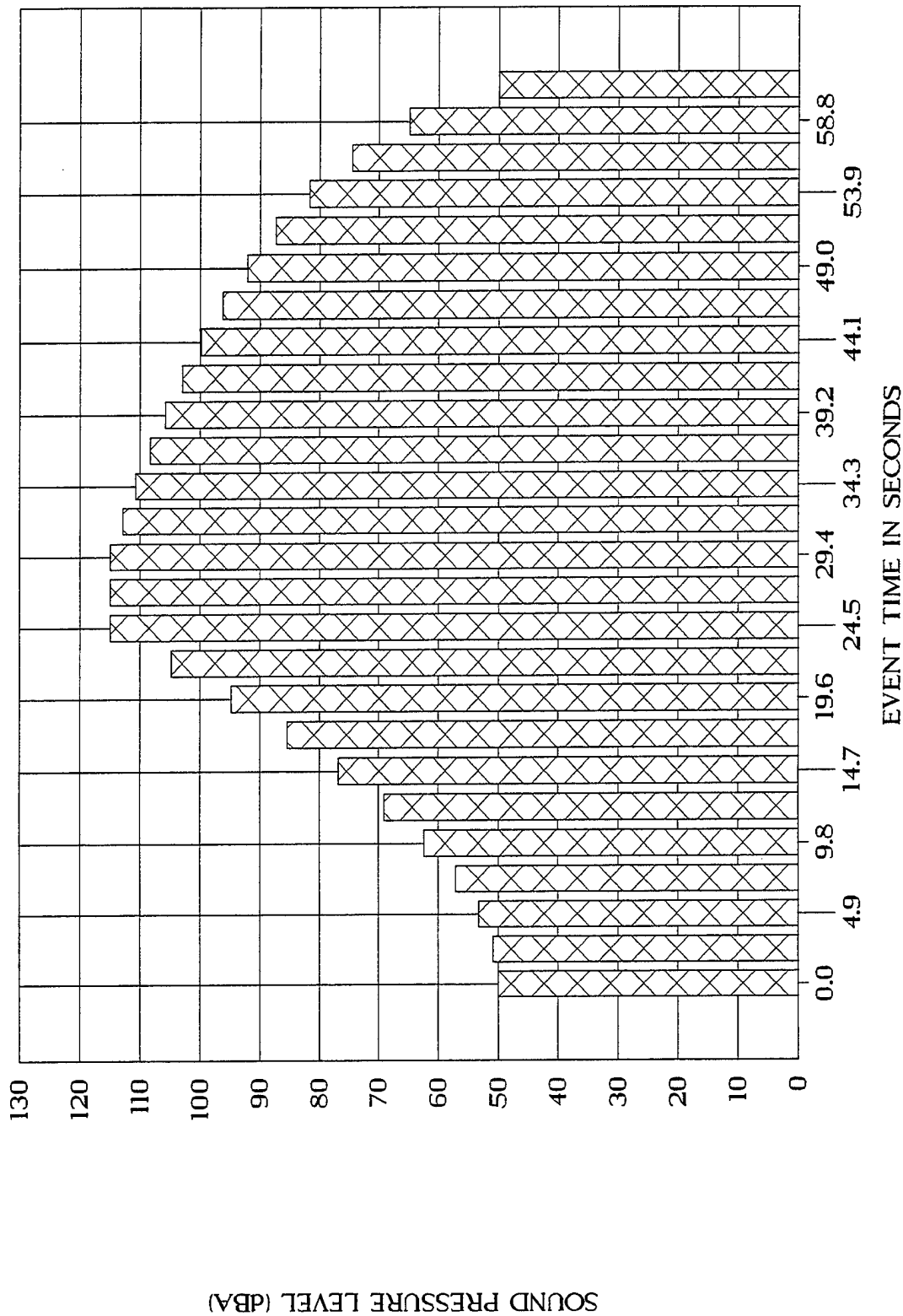


TABLE F-14 F/A-18 FLYOVER SIMULATION, TAKEOFF POWER, 250 KNOTS

INPUT=> PEAK dB = 116.11 dBA 315 FT SLANT DIST.  
 INPUT=> EVENT DURATION = 46.80 seconds (4 NM) 288 MPH  
 INPUT=> BACKGROUND dB = 50.00 dBA 250 KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
50.81	120613	2	0.81	1	1.9
53.24	210652	3	2.42	2	3.7
57.21	525480	4	3.97	3	5.6
62.63	1830580	5	5.42	4	7.5
69.36	8636088	6	6.74	5	9.4
77.25	53106991	7	7.89	6	11.2
86.10	407069727	8	8.85	7	13.1
95.68	3699036785	9	9.58	8	15.0
105.77	37740856474	10	10.09	9	16.8
116.11	408319386333	11	10.34	10	18.7
116.11	408319386333	12	0.00	11	20.6
116.11	408319386333	13	0.00	12	22.5
114.05	254105801794	14	-2.06	13	24.3
111.83	152440668904	15	-2.22	14	26.2
109.43	87616800583	16	-2.41	15	28.1
106.80	47870585359	17	-2.63	16	30.0
103.91	24609852786	18	-2.89	17	31.8
100.70	11743002585	19	-3.21	18	33.7
97.08	5103886624	20	-3.62	19	35.6
92.94	1966721943	21	-4.14	20	37.4
88.10	645069908	22	-4.84	21	39.3
82.27	168631654	23	-5.83	22	41.2
74.95	31268904	24	-7.32	23	43.1
65.10	3239491	25	-9.85	24	44.9
50.00	100000	26	-15.10	25	46.8

SEL = 125.23 dBA ERROR CHECK:  
 Leq(event) = 108.53 dBA INITIAL dB = 50.00  
 L(max) = 116.11 dBA FINAL dB = 50.00  
 PEAK - SEL = -9.12 dBA  
 PEAK - Leq = 7.58 dBA NOISE RISE: REVERSED SINE CURVE  
 SEL - Leq = 16.70 dBA NOISE DECAY: DECLINING LOG CURVE  
 SEL delta10 = 125.20 dBA  
 Event Rate = 1.0 per hour  
 Leq(1 hr) = 89.67 dBA

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

MILITARY/IRP POWER, 250 KNOTS, 315 FEET

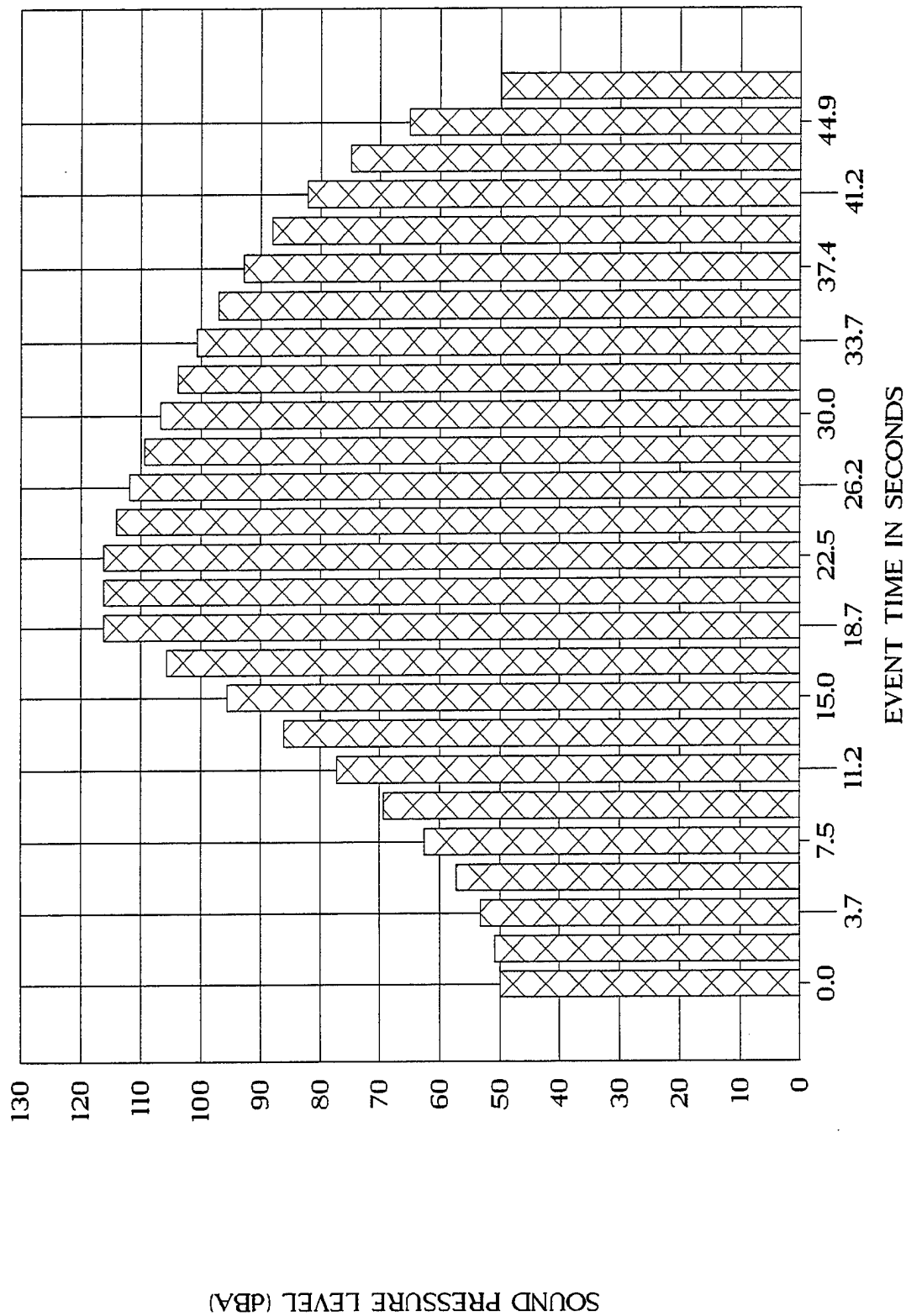


TABLE F-15 F/A-18 FLYOVER SIMULATION, IRP POWER, 300 KNOTS

INPUT=> PEAK dB = 117.03 dBA 315 FT SLANT DIST.  
 INPUT=> EVENT DURATION = 37.20 seconds (4 NM) 345 MPH  
 INPUT=> BACKGROUND dB = 50.00 dBA 300 KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
51.02	126425	2	1.02	1	1.5
54.04	253653	3	3.02	2	3.0
58.98	790736	4	4.94	3	4.5
65.68	3700020	5	6.70	4	6.0
73.94	24796744	6	8.26	5	7.4
83.52	224646678	7	9.57	6	8.9
94.10	2572995219	8	10.59	7	10.4
105.39	34596826617	9	11.29	8	11.9
117.03	504661297564	10	11.64	9	13.4
117.03	504661297564	11	0.00	10	14.9
117.03	504661297564	12	0.00	11	16.4
115.10	323275856954	13	-1.93	12	17.9
113.02	200619767081	14	-2.07	13	19.3
110.79	120029662105	15	-2.23	14	20.8
108.38	68814229285	16	-2.42	15	22.3
105.74	37513285567	17	-2.63	16	23.8
102.84	19250716376	18	-2.90	17	25.3
99.63	9175951463	19	-3.22	18	26.8
96.01	3988513063	20	-3.62	19	28.3
91.88	1540014503	21	-4.13	20	29.8
87.06	507808207	22	-4.82	21	31.2
81.28	134274631	23	-5.78	22	32.7
74.07	25499055	24	-7.21	23	34.2
64.45	2787183	25	-9.61	24	35.7
50.00	100000	26	-14.45	25	37.2

SEL = 125.24 dBA ERROR CHECK:  
 Leq(event) = 109.54 dBA INITIAL dB = 50.00  
 L(max) = 117.03 dBA FINAL dB = 50.00  
 PEAK - SEL = -8.21 dBA  
 PEAK - Leq = 7.49 dBA NOISE RISE: REVERSED SINE CURVE  
 SEL - Leq = 15.71 dBA NOISE DECAY: DECLINING LOG CURVE  
 SEL delta10 = 125.20 dBA  
 Event Rate = 1.0 per hour  
 Leq(1 hr) = 89.68 dBA

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

MILITARY/IRP POWER, 300 KNOTS, 315 FEET

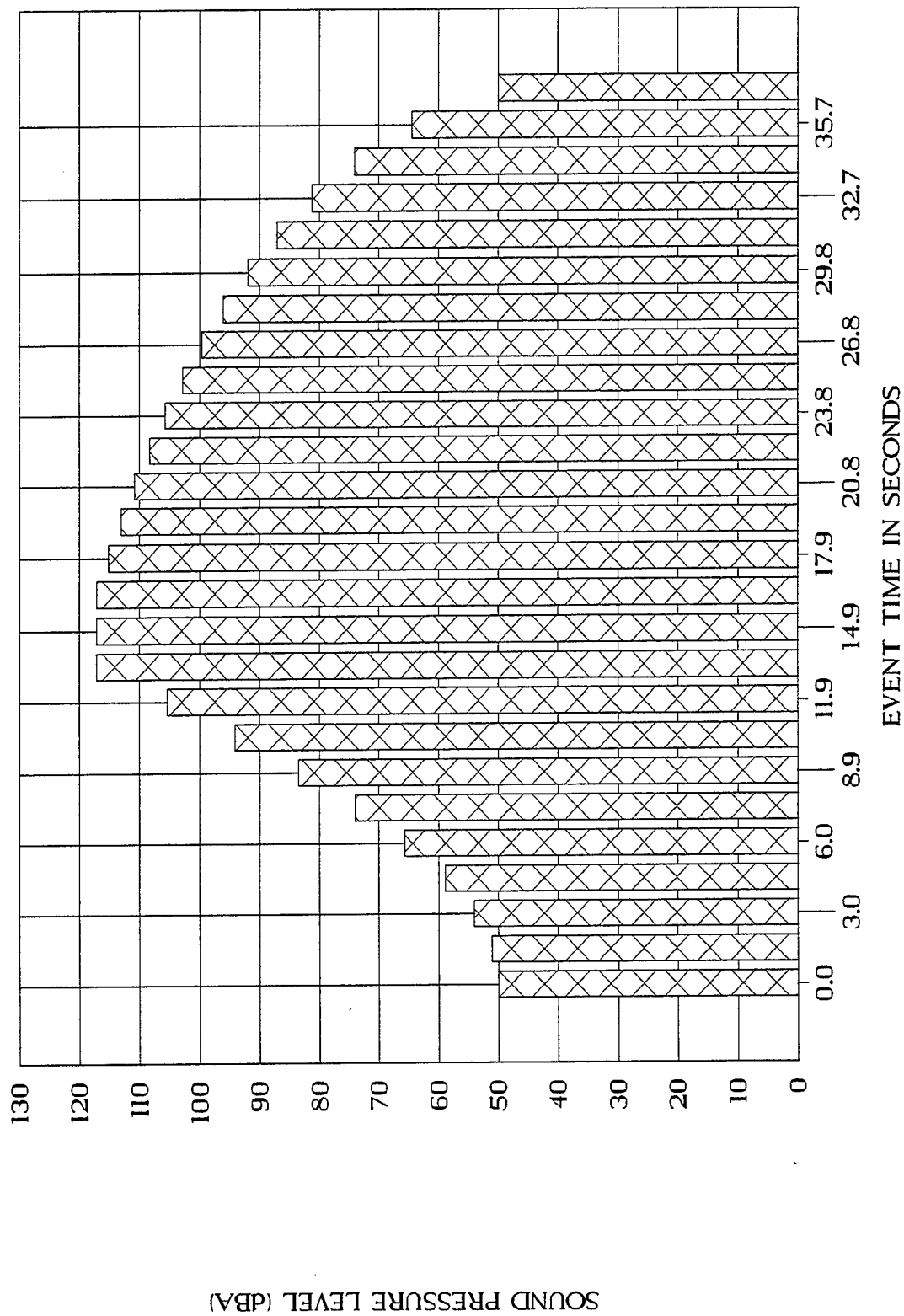


TABLE F-16 F/A-18 FLYOVER SIMULATION, IRP POWER, 350 KNOTS

INPUT=>	PEAK dB =	117.84 dBA	315	FT SLANT DIST.
INPUT=>	EVENT DURATION =	30.30 seconds (4 NM)	403	MPH
INPUT=>	BACKGROUND dB =	50.00 dBA	350	KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
51.30	135006	2	1.30	1	1.2
55.16	328399	3	3.86	2	2.4
61.43	1390946	4	6.27	3	3.6
69.87	9704822	5	8.44	4	4.8
80.15	103516967	6	10.28	5	6.1
91.88	1541258891	7	11.73	6	7.3
104.61	28874020165	8	12.73	7	8.5
117.84	608135001279	9	13.23	8	9.7
117.84	608135001279	10	0.00	9	10.9
117.84	608135001279	11	0.00	10	12.1
116.02	399667983056	12	-1.82	11	13.3
114.07	255487965449	13	-1.94	12	14.5
111.99	158238870601	14	-2.08	13	15.8
109.75	94501654063	15	-2.24	14	17.0
107.33	54093502621	16	-2.42	15	18.2
104.69	29452688453	17	-2.64	16	19.4
101.79	15104122816	18	-2.90	17	20.6
98.57	7200566792	19	-3.22	18	21.8
94.96	3134361832	20	-3.61	19	23.0
90.84	1214436974	21	-4.12	20	24.2
86.06	403230128	22	-4.79	21	25.5
80.34	108023958	23	-5.72	22	26.7
73.23	21037565	24	-7.11	23	27.9
63.85	2425213	25	-9.38	24	29.1
50.00	100000	26	-13.85	25	30.3

SEL =	125.25 dBA	ERROR CHECK:	
Leq(event) =	110.43 dBA	INITIAL dB =	50.00
L(max) =	117.84 dBA	FINAL dB =	50.00
PEAK - SEL =	-7.41 dBA		
PEAK - Leq =	7.41 dBA	NOISE RISE:	REVERSED SINE CURVE
SEL - Leq =	14.81 dBA	NOISE DECAY:	DECLINING LOG CURVE

SEL delta10 = 125.20 dBA

Event Rate = 1.0 per hour  
 Leq(1 hr) = 89.69 dBA

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

MILITARY/IRP POWER, 350 KNOTS, 315 FEET

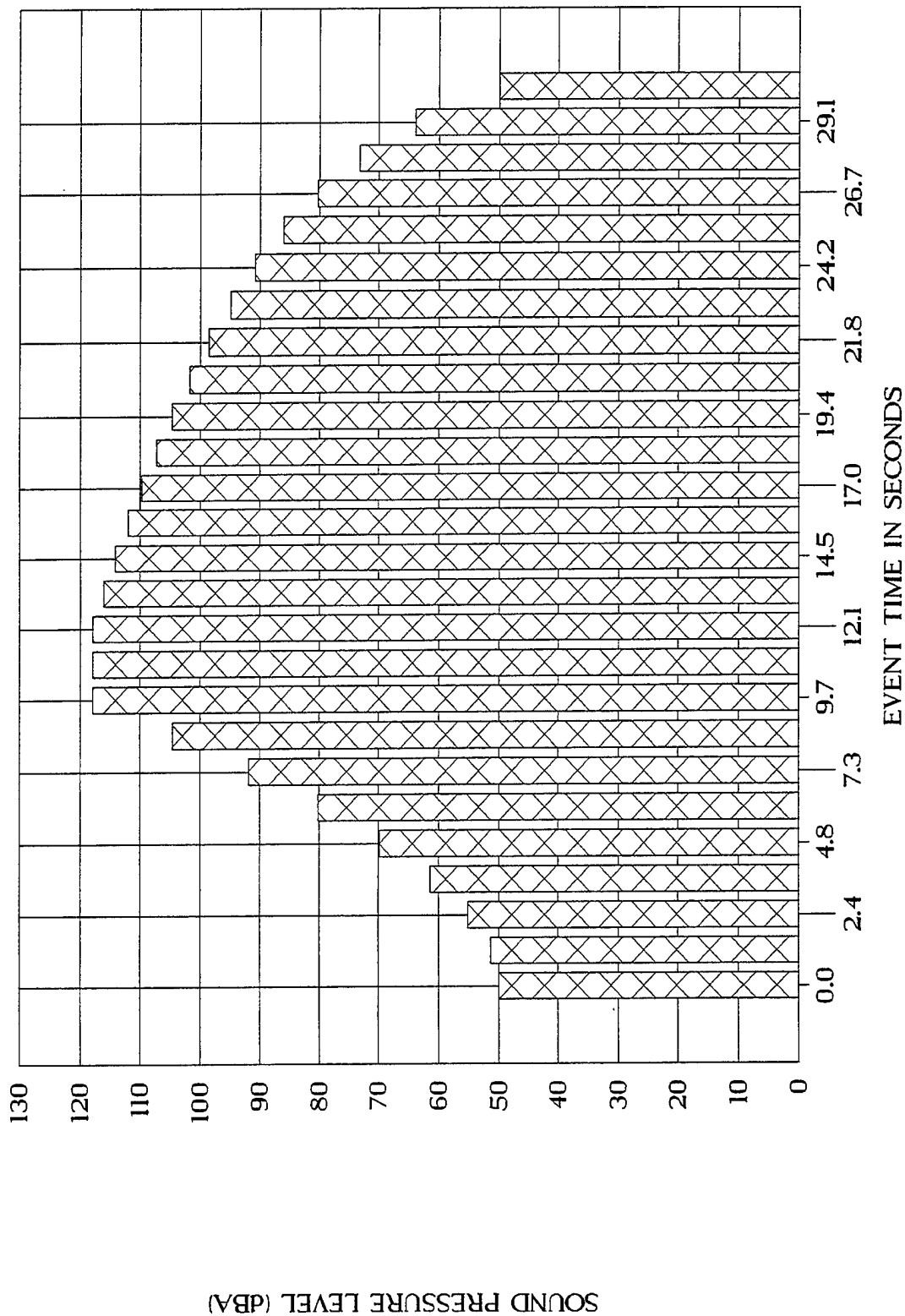


TABLE F-17 F/A-18 FLYOVER SIMULATION, IRP POWER, 400 KNOTS

INPUT=>	PEAK dB =	118.47 dBA	315	FT SLANT DIST.
INPUT=>	EVENT DURATION =	25.20 seconds (4 NM)	460	MPH
INPUT=>	BACKGROUND dB =	50.00 dBA	400	KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
51.72	148480	2	1.72	1	1.0
56.78	476504	3	5.06	2	2.0
64.94	3117452	4	8.16	3	3.0
75.78	37841237	5	10.84	4	4.0
88.76	751965712	6	12.98	5	5.0
103.23	21057129363	7	14.47	6	6.0
118.47	703072319884	8	15.24	7	7.1
118.47	703072319884	9	0.00	8	8.1
118.47	703072319884	10	0.00	9	9.1
116.75	472983114688	11	-1.72	10	10.1
114.92	310533724886	12	-1.83	11	11.1
112.97	198336508855	13	-1.95	12	12.1
110.89	122757704016	14	-2.08	13	13.1
108.65	73280528306	15	-2.24	14	14.1
106.23	41943023931	16	-2.42	15	15.1
103.59	22846335138	17	-2.64	16	16.1
100.69	11729063431	18	-2.90	17	17.1
97.48	5603290938	19	-3.21	18	18.1
93.89	2447804668	20	-3.60	19	19.2
89.80	953990081	21	-4.09	20	20.2
85.05	319790363	22	-4.75	21	21.2
79.40	87046035	23	-5.65	22	22.2
72.41	17435188	24	-6.98	23	23.2
63.27	2123664	25	-9.14	24	24.2
50.00	100000	26	-13.27	25	25.2

SEL =	125.17 dBA	ERROR CHECK:	
Leq(event) =	111.16 dBA	INITIAL dB =	50.00
L(max) =	118.47 dBA	FINAL dB =	50.00
PEAK - SEL =	-6.70 dBA		
PEAK - Leq =	7.31 dBA	NOISE RISE:	REVERSED SINE CURVE
SEL - Leq =	14.01 dBA	NOISE DECAY:	DECLINING LOG CURVE

SEL delta10 = 125.20 dBA

Event Rate = 1.0 per hour  
Leq(1 hr) = 89.61 dBA

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

MILITARY/IRP POWER, 400 KNOTS, 315 FEET

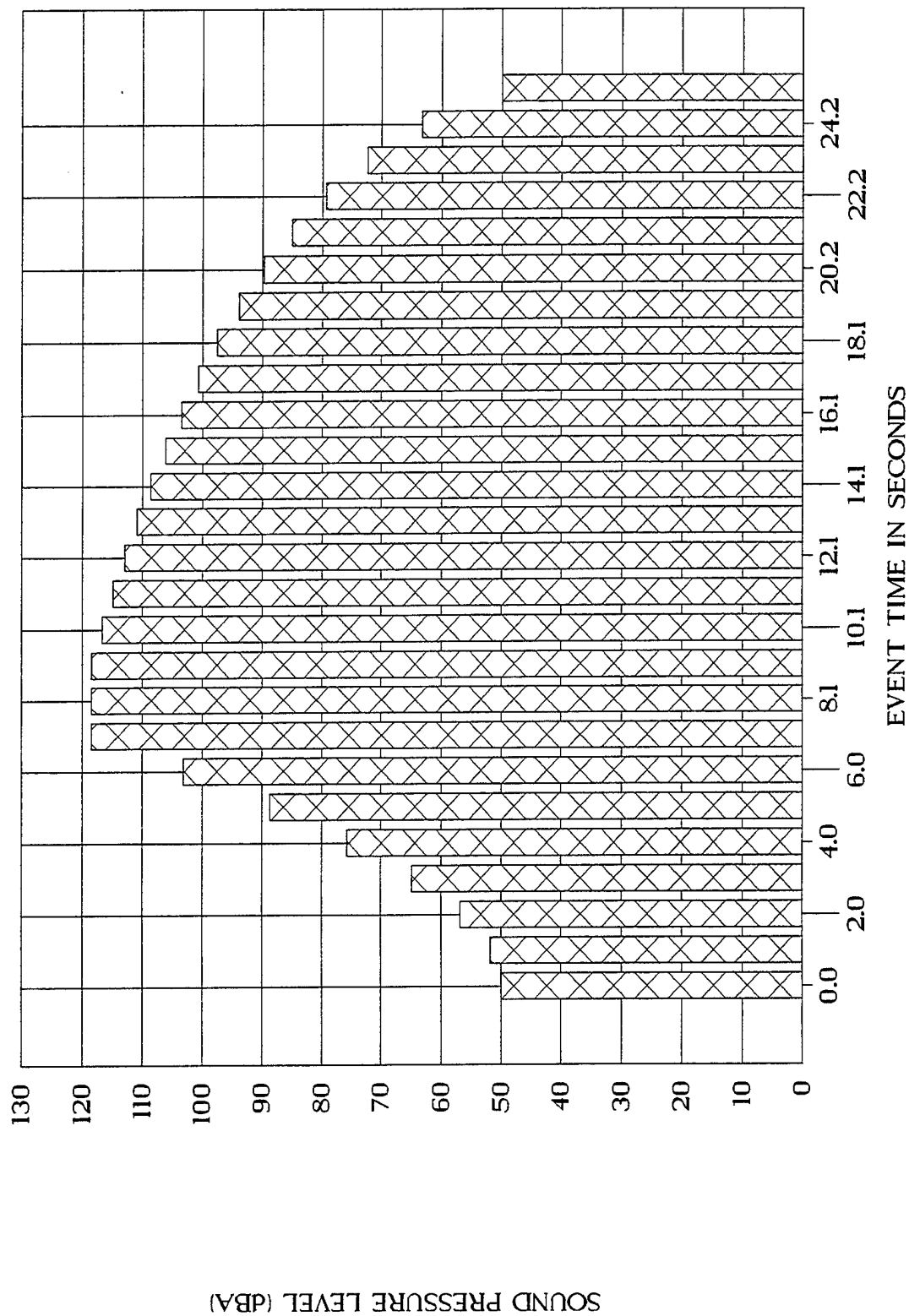


TABLE F-18 F/A-18 FLYOVER SIMULATION, AFTERBURNER TAKEOFF, 150 KNOTS

INPUT=>	PEAK dB =	119.26 dBA	315	FT SLANT DIST.
INPUT=>	EVENT DURATION =	85.20 seconds (4 NM)	173	MPH
INPUT=>	BACKGROUND dB =	50.00 dBA	150	KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
50.70	117624	2	0.70	1	3.4
52.81	190788	3	2.10	2	6.8
56.26	422560	4	3.45	3	10.2
60.99	1257413	5	4.74	4	13.6
66.92	4916754	6	5.92	5	17.0
73.90	24571663	7	6.99	6	20.4
81.82	151887383	8	7.91	7	23.9
90.49	1119014257	9	8.67	8	27.3
99.75	9434530902	10	9.26	9	30.7
109.40	87162048811	11	9.66	10	34.1
119.26	843334757764	12	9.86	11	37.5
119.26	843334757764	13	0.00	12	40.9
119.26	843334757764	14	0.00	13	44.3
116.91	491470710566	15	-2.35	14	47.7
114.37	273624814087	16	-2.54	15	51.1
111.59	144312380806	17	-2.78	16	54.5
108.53	71309768267	18	-3.06	17	57.9
105.12	32528572142	19	-3.41	18	61.3
101.28	13419983672	20	-3.85	19	64.8
96.87	4861608025	21	-4.41	20	68.2
91.70	1478657192	22	-5.17	21	71.6
85.45	350997609	23	-6.25	22	75.0
77.56	57033825	24	-7.89	23	78.4
66.83	4822603	25	-10.73	24	81.8
50.00	100000	26	-16.83	25	85.2

SEL =	130.79 dBA	ERROR CHECK:	
Leq(event) =	111.49 dBA	INITIAL dB =	50.00
L(max) =	119.26 dBA	FINAL dB =	50.00
PEAK - SEL =	-11.53 dBA		
PEAK - Leq =	7.77 dBA	NOISE RISE:	REVERSED SINE CURVE
SEL - Leq =	19.30 dBA	NOISE DECAY:	DECLINING LOG CURVE

SEL delta10 =	130.80 dBA
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Event Rate =	1.0 per hour
Leq(1 hr) =	95.23 dBA

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

MAX AB TAKEOFF, 150 KNOTS, 315 FEET

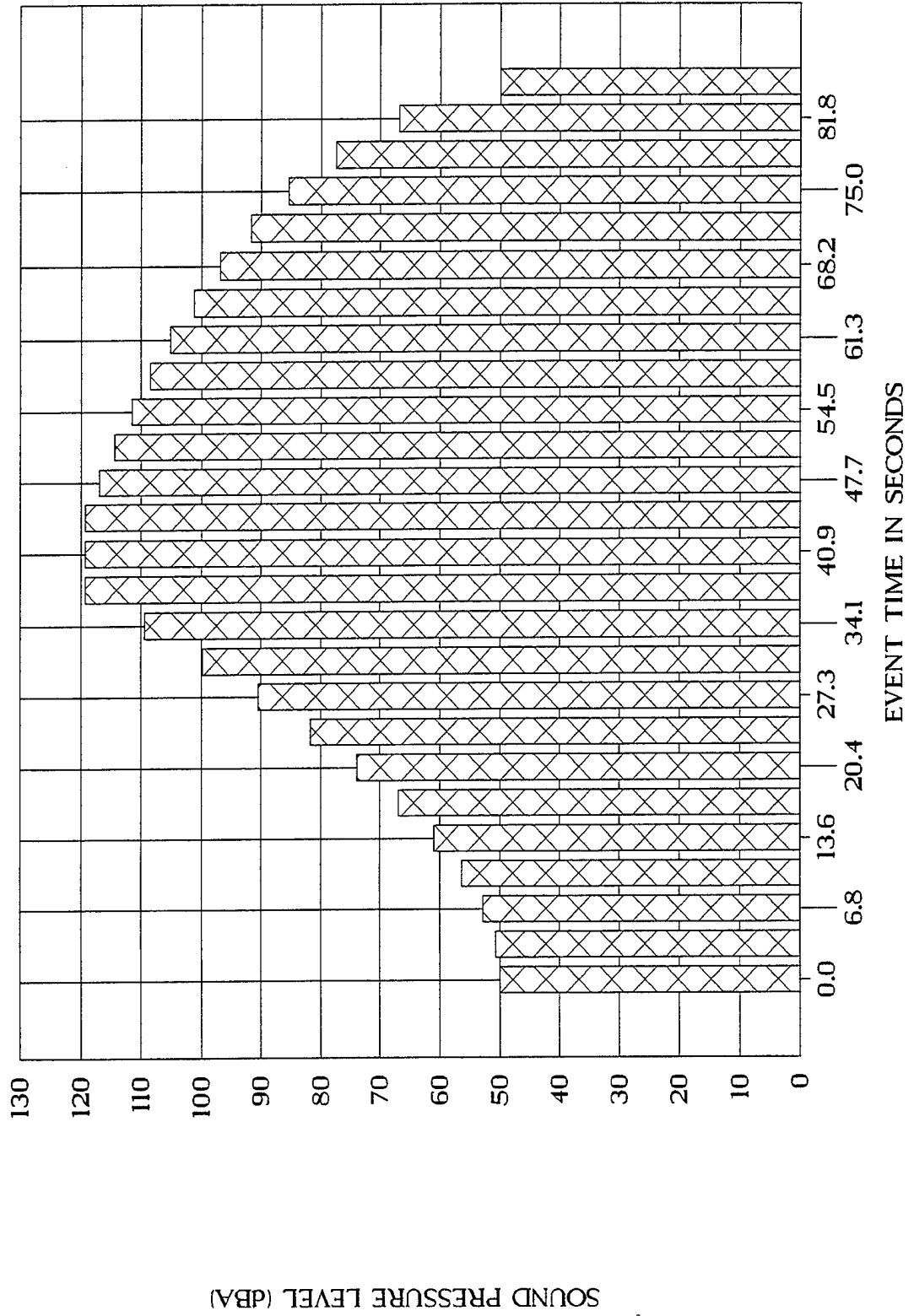


TABLE F-19 F/A-18 FLYOVER SIMULATION, AFTERBURNER TAKEOFF, 175 KNOTS

INPUT=>	PEAK dB =	120.04 dBA	315	FT SLANT DIST.
INPUT=>	EVENT DURATION =	71.50 seconds (4 NM)	201	MPH
INPUT=>	BACKGROUND dB =	50.00 dBA	175	KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
50.71	117839	2	0.71	1	2.9
52.84	192181	3	2.12	2	5.7
56.33	429475	4	3.49	3	8.6
61.12	1293779	5	4.79	4	11.4
67.11	5137241	6	5.99	5	14.3
74.17	26143000	7	7.07	6	17.2
82.17	164949770	8	8.00	7	20.0
90.94	1242891589	9	8.77	8	22.9
100.31	10733594195	10	9.36	9	25.7
110.07	101677971355	11	9.76	10	28.6
120.04	1009252886077	12	9.97	11	31.5
120.04	1009252886077	13	0.00	12	34.3
120.04	1009252886077	14	0.00	13	37.2
117.67	584597153135	15	-2.37	14	40.0
115.10	323333092231	16	-2.57	15	42.9
112.29	169304742805	17	-2.81	16	45.8
109.19	82997817478	18	-3.10	17	48.6
105.74	37526982220	19	-3.45	18	51.5
101.86	15328521848	20	-3.89	19	54.3
97.40	5489869764	21	-4.46	20	57.2
92.17	1647510455	22	-5.23	21	60.1
85.85	384796453	23	-6.32	22	62.9
77.87	61259270	24	-7.98	23	65.8
67.02	5037772	25	-10.85	24	68.6
50.00	100000	26	-17.02	25	71.5

SEL =	130.79 dBA	ERROR CHECK:	
Leq(event) =	112.25 dBA	INITIAL dB =	50.00
L(max) =	120.04 dBA	FINAL dB =	50.00
PEAK - SEL =	-10.75 dBA		
PEAK - Leq =	7.79 dBA	NOISE RISE:	REVERSED SINE CURVE
SEL - Leq =	18.54 dBA	NOISE DECAY:	DECLINING LOG CURVE
SEL delta10 =	130.80 dBA		
Event Rate =	1.0 per hour		
Leq(1 hr) =	95.23 dBA		

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

MAX AB TAKEOFF, 175 KNOTS, 315 FEET

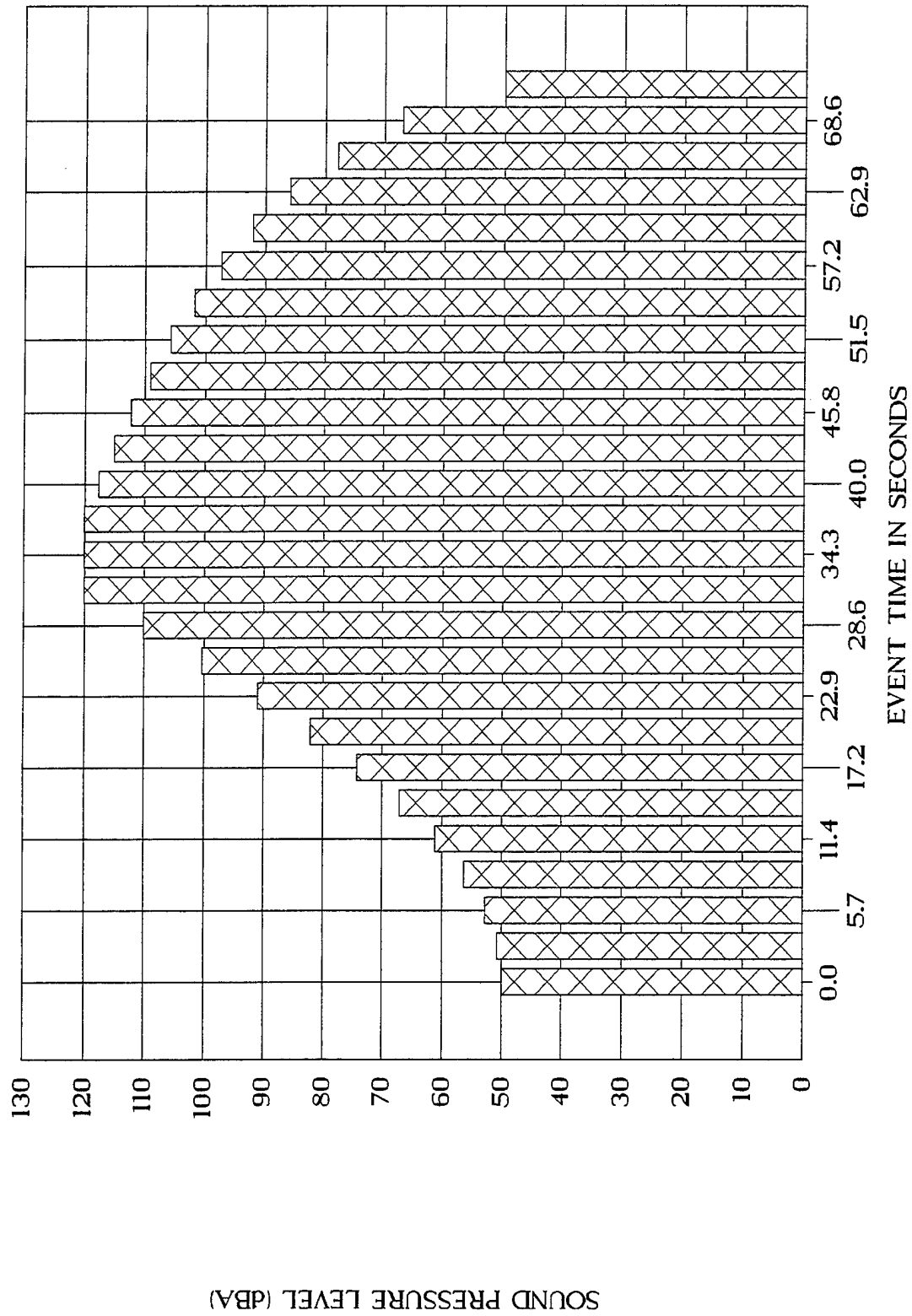


TABLE F-20 F/A-18 FLYOVER SIMULATION, AFTERBURNER TAKEOFF, 200 KNOTS

INPUT=>	PEAK dB =	120.63 dBA	315	FT SLANT DIST.
INPUT=>	EVENT DURATION =	61.20 seconds (4 NM)	230	MPH
INPUT=>	BACKGROUND dB =	50.00 dBA	200	KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
50.87	122168	2	0.87	1	2.4
53.46	221660	3	2.59	2	4.9
57.70	588601	4	4.24	3	7.3
63.49	2233125	5	5.79	4	9.8
70.69	11713989	6	7.20	5	12.2
79.11	81559164	7	8.43	6	14.7
88.56	718563413	8	9.45	7	17.1
98.80	7592992462	9	10.24	8	19.6
109.58	90803664088	10	10.78	9	22.0
120.63	1156112242192	11	11.05	10	24.5
120.63	1156112242192	12	0.00	11	26.9
120.63	1156112242192	13	0.00	12	29.4
118.43	696516121796	14	-2.20	13	31.8
116.06	403501354358	15	-2.37	14	34.3
113.49	223299330390	16	-2.57	15	36.7
110.68	117063130177	17	-2.80	16	39.2
107.60	57504783800	18	-3.09	17	41.6
104.16	26085820705	19	-3.43	18	44.1
100.30	10709875792	20	-3.87	19	46.5
95.87	3866428837	21	-4.42	20	49.0
90.70	1175095102	22	-5.17	21	51.4
84.48	280264326	23	-6.23	22	53.9
76.66	46313302	24	-7.82	23	56.3
66.14	4109126	25	-10.52	24	58.8
50.00	100000	26	-16.14	25	61.2

SEL =	130.80 dBA	ERROR CHECK:	
Leq(event) =	112.93 dBA	INITIAL dB =	50.00
L(max) =	120.63 dBA	FINAL dB =	50.00
PEAK - SEL =	-10.17 dBA		
PEAK - Leq =	7.70 dBA	NOISE RISE:	REVERSED SINE CURVE
SEL - Leq =	17.87 dBA	NOISE DECAY:	DECLINING LOG CURVE

SEL delta10 = 130.80 dBA

Event Rate = 1.0 per hour  
Leq(1 hr) = 95.24 dBA

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

MAX AB TAKEOFF, 200 KNOTS, 315 FEET

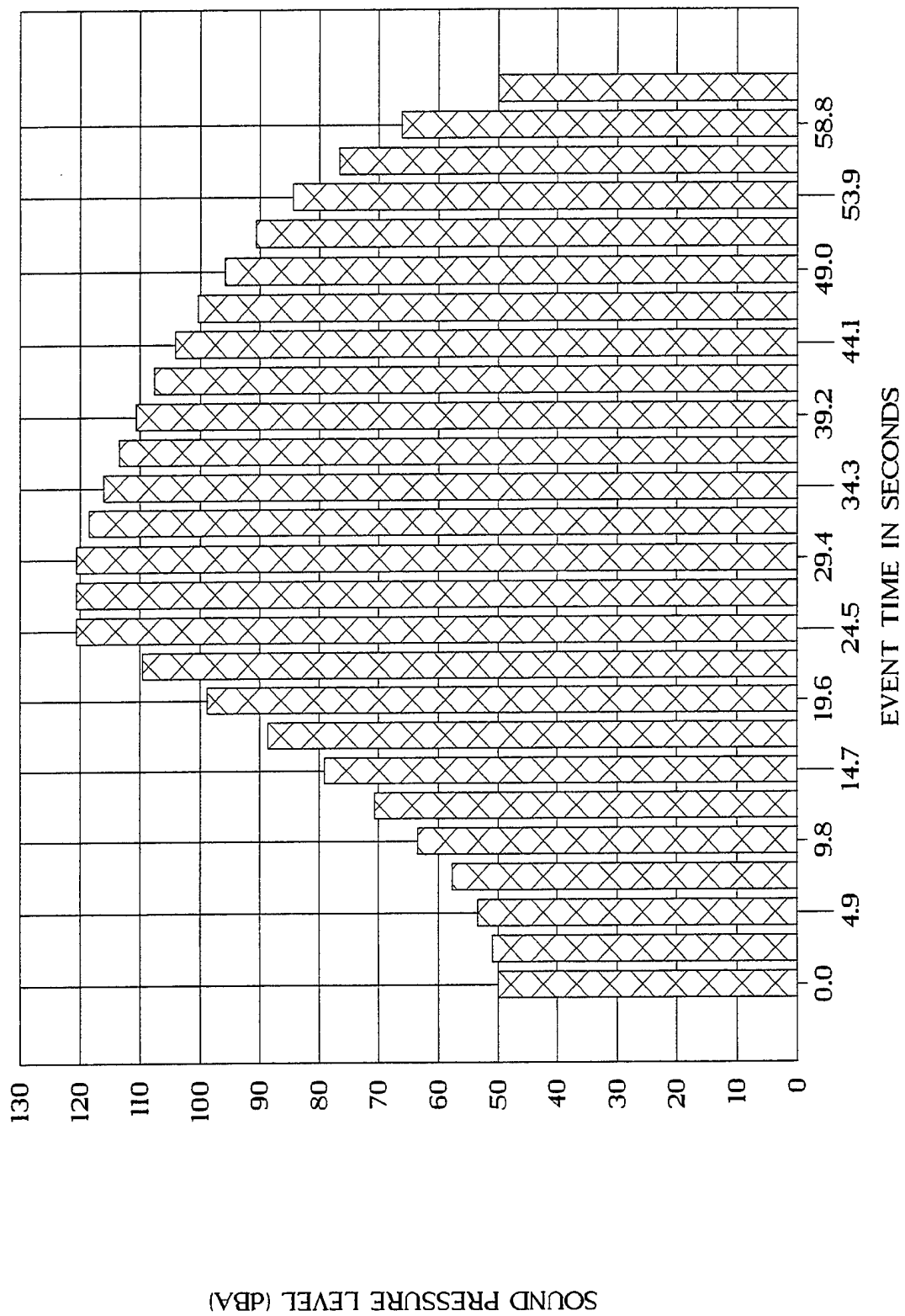


TABLE F-21 F/A-18 FLYOVER SIMULATION, AFTERBURNER TAKEOFF, 250 KNOTS

INPUT=> PEAK dB = 121.92 dBA 315 FT SLANT DIST.  
 INPUT=> EVENT DURATION = 46.80 seconds (4 NM) 288 MPH  
 INPUT=> BACKGROUND dB = 50.00 dBA 250 KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
50.89	122616	2	0.89	1	1.9
53.52	224906	3	2.63	2	3.7
57.84	607968	4	4.32	3	5.6
63.74	2363468	5	5.90	4	7.5
71.06	12778740	6	7.33	5	9.4
79.65	92182496	7	8.58	6	11.2
89.27	845084869	8	9.62	7	13.1
99.70	9322873179	9	10.43	8	15.0
110.67	116660364071	10	10.97	9	16.8
121.92	1555965631605	11	11.25	10	18.7
121.92	1555965631605	12	0.00	11	20.6
121.92	1555965631605	13	0.00	12	22.5
119.68	928777730159	14	-2.24	13	24.3
117.26	532715617710	15	-2.41	14	26.2
114.65	291638415690	16	-2.62	15	28.1
111.79	151096683991	17	-2.86	16	30.0
108.65	73265635998	18	-3.14	17	31.8
105.15	32759009795	19	-3.50	18	33.7
101.22	13232728171	20	-3.94	19	35.6
96.71	4689143677	21	-4.51	20	37.4
91.44	1394471420	22	-5.27	21	39.3
85.11	323992434	23	-6.34	22	41.2
77.14	51807509	24	-7.96	23	43.1
66.43	4397677	25	-10.71	24	44.9
50.00	100000	26	-16.43	25	46.8

SEL = 130.89 dBA ERROR CHECK:  
 Leq(event) = 114.19 dBA INITIAL dB = 50.00  
 L(max) = 121.92 dBA FINAL dB = 50.00  
 PEAK - SEL = -8.97 dBA  
 PEAK - Leq = 7.73 dBA NOISE RISE: REVERSED SINE CURVE  
 SEL - Leq = 16.70 dBA NOISE DECAY: DECLINING LOG CURVE  
  
 SEL delta10 = 130.80 dBA  
  
 Event Rate = 1.0 per hour  
 Leq(1 hr) = 95.33 dBA

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

MAX AB TAKEOFF, 250 KNOTS, 315 FEET

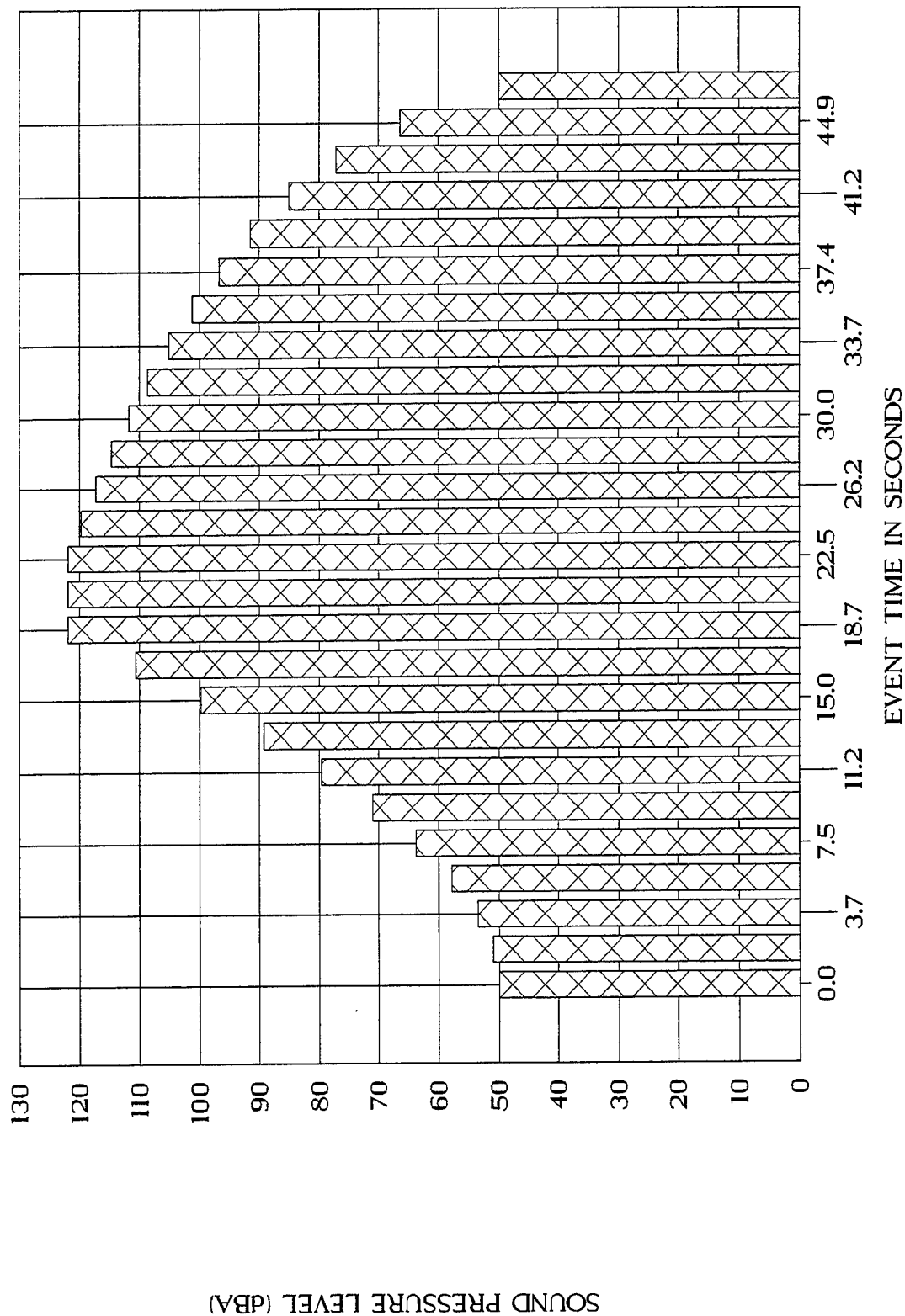


TABLE F-22 F/A-18 FLYOVER SIMULATION, AFTERBURNER POWER, 300 KNOTS

INPUT=>	PEAK dB =	122.73 dBA	315	FT SLANT DIST.
INPUT=>	EVENT DURATION =	37.20 seconds (4 NM)	345	MPH
INPUT=>	BACKGROUND dB =	50.00 dBA	300	KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
51.10	128971	2	1.10	1	1.5
54.39	274546	3	3.28	2	3.0
59.74	942752	4	5.36	3	4.5
67.02	5029893	5	7.27	4	6.0
75.98	39628325	6	8.96	5	7.4
86.37	433012068	7	10.38	6	8.9
97.85	6102214894	8	11.49	7	10.4
110.10	102342684330	9	12.25	8	11.9
122.73	1874994508067	10	12.63	9	13.4
122.73	1874994508067	11	0.00	10	14.9
122.73	1874994508067	12	0.00	11	16.4
120.63	1156444859051	13	-2.10	12	17.9
118.38	689137439623	14	-2.25	13	19.3
115.96	394684722468	15	-2.42	14	20.8
113.34	215821284619	16	-2.62	15	22.3
110.48	111736375025	17	-2.86	16	23.8
107.34	54177384184	18	-3.14	17	25.3
103.85	24246990410	19	-3.49	18	26.8
99.92	9818567240	20	-3.93	19	28.3
95.44	3496370741	21	-4.48	20	29.8
90.21	1049106645	22	-5.23	21	31.2
83.94	247735239	23	-6.27	22	32.7
76.11	40847604	24	-7.83	23	34.2
65.68	3698770	25	-10.43	24	35.7
50.00	100000	26	-15.68	25	37.2

SEL =	130.80 dBA	ERROR CHECK:	
Leq(event) =	115.09 dBA	INITIAL dB =	50.00
L(max) =	122.73 dBA	FINAL dB =	50.00
PEAK - SEL =	-8.07 dBA		
PEAK - Leq =	7.64 dBA	NOISE RISE:	REVERSED SINE CURVE
SEL - Leq =	15.71 dBA	NOISE DECAY:	DECLINING LOG CURVE

SEL delta10 = 130.80 dBA

Event Rate = 1.0 per hour  
 Leq(1 hr) = 95.23 dBA

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

AFTERBURNER, 300 KNOTS, 315 FEET

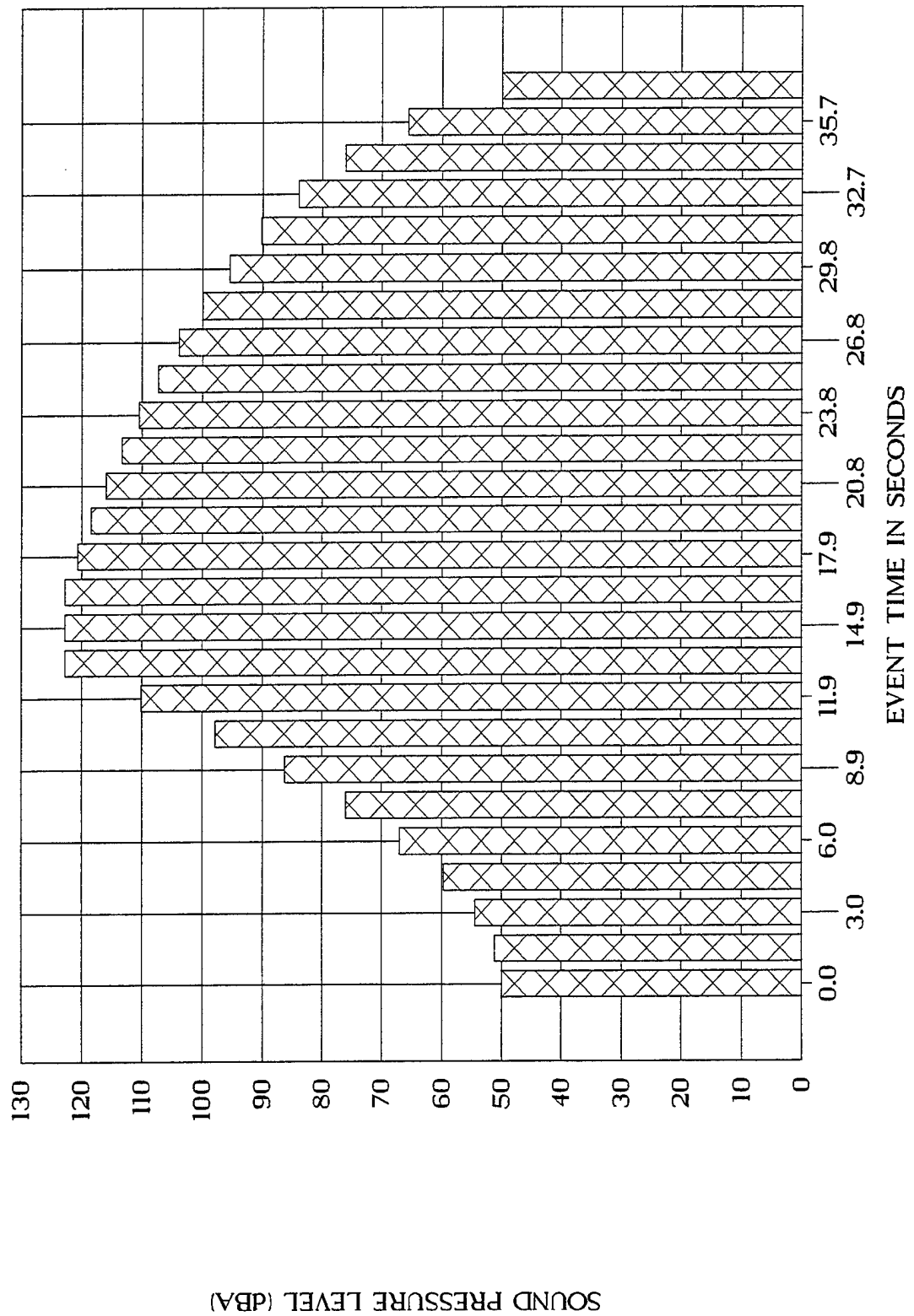


TABLE F-23 F/A-18 FLYOVER SIMULATION, AFTERBURNER POWER, 350 KNOTS

INPUT=> PEAK dB = 123.54 dBA 315 FT SLANT DIST.  
 INPUT=> EVENT DURATION = 30.30 seconds (4 NM) 403 MPH  
 INPUT=> BACKGROUND dB = 50.00 dBA 350 KNOTS

ESTIMATED DECIBEL LEVEL	CALCS	DATA POINT SEQUENCE	INCREMENTAL dB CHANGE	INTERVAL COUNT	EVENT TIME (SECONDS)
50.00	100000	1	0.00	0	0.0
51.41	138454	2	1.41	1	1.2
55.60	362902	3	4.18	2	2.4
62.39	1735292	4	6.80	3	3.6
71.54	14253999	5	9.15	4	4.8
82.68	185496836	6	11.14	5	6.1
95.40	3465341490	7	12.71	6	7.3
109.19	83043524279	8	13.80	7	8.5
123.54	2259435770221	9	14.35	8	9.7
123.54	2259435770221	10	0.00	9	10.9
123.54	2259435770221	11	0.00	10	12.1
121.56	1433448964919	12	-1.98	11	13.3
119.46	882522061903	13	-2.11	12	14.5
117.20	525033567439	14	-2.26	13	15.8
114.78	300263925213	15	-2.43	14	17.0
112.15	164002695584	16	-2.63	15	18.2
109.29	84849156382	17	-2.86	16	19.4
106.14	41138595894	18	-3.14	17	20.6
102.65	18428440684	19	-3.49	18	21.8
98.74	7480335799	20	-3.92	19	23.0
94.28	2676388630	21	-4.46	20	24.2
89.08	810020399	22	-5.19	21	25.5
82.88	194267505	23	-6.20	22	26.7
75.18	32974361	24	-7.70	23	27.9
65.01	3170285	25	-10.17	24	29.1
50.00	100000	26	-15.01	25	30.3

SEL =	130.80 dBA	ERROR CHECK:	
Leq(event) =	115.99 dBA	INITIAL dB =	50.00
L(max) =	123.54 dBA	FINAL dB =	50.00
PEAK - SEL =	-7.26 dBA		
PEAK - Leq =	7.55 dBA	NOISE RISE:	REVERSED SINE CURVE
SEL - Leq =	14.81 dBA	NOISE DECAY:	DECLINING LOG CURVE
SEL delta10 =	130.80 dBA		
Event Rate =	1.0 per hour		
Leq(1 hr) =	95.24 dBA		

# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

AFTERBURNER, 350 KNOTS, 315 FEET

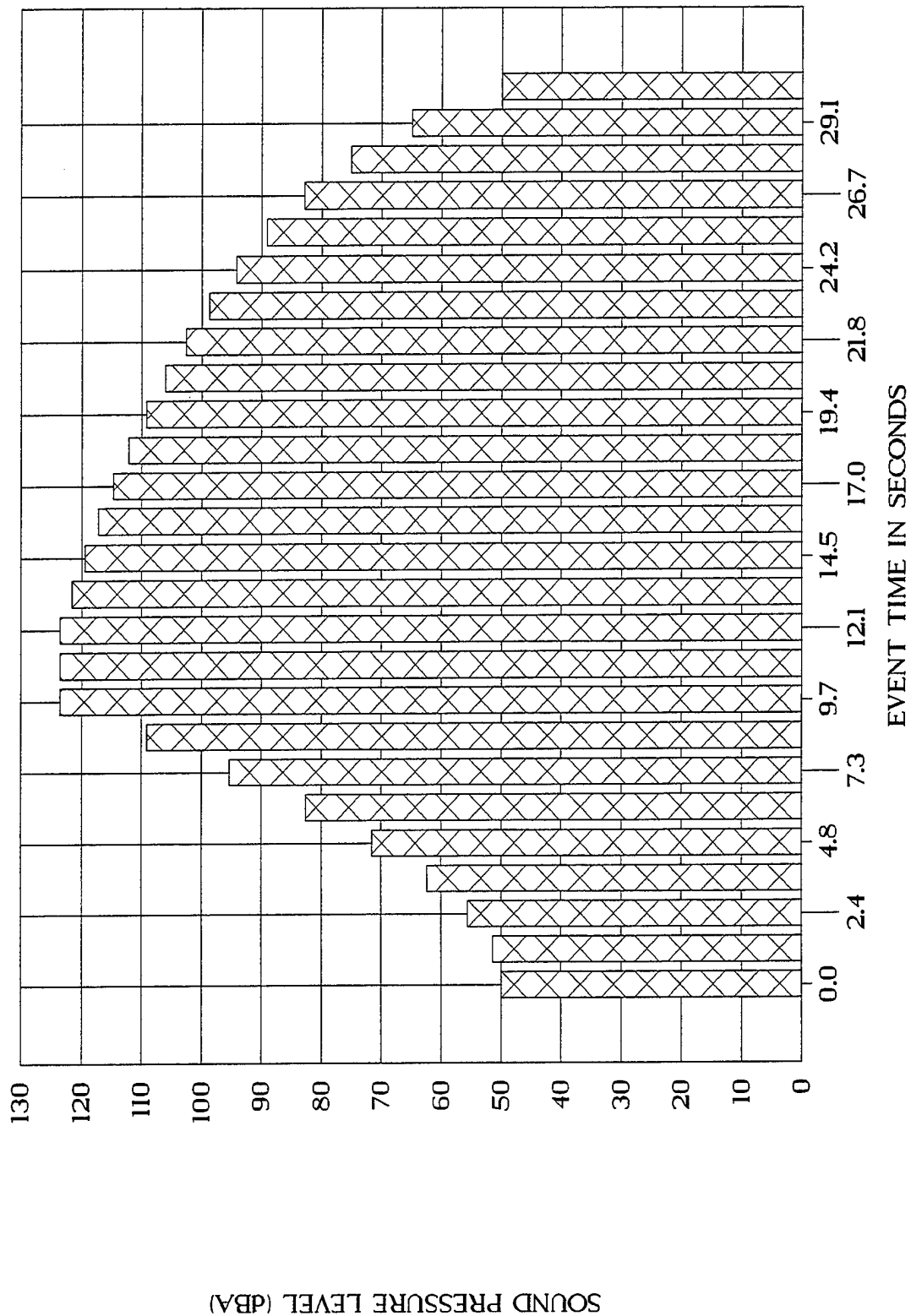


TABLE F-24      MODELED NOISE LEVELS, APPROACH POWER, 150 KNOTS

==> Basic sound level drop-off rate:                    5.30 dB/doubling  
 ==> Atmospheric absorption coefficient:                0.21 dB/100 meters  
 ==> Reference Level (SEL, Lmax, Leq):                106.89 Lmax dBA  
 ==> Distance for Reference Noise Level:                315 Feet

DISTANCE ATTENUATION:

Receptor Distance (feet)	Lmax Value (dBA) at Receptor
100	115.8
300	107.3
361	105.8
500	103.2
539	102.6
583	102.0
632	101.4
707	100.5
808	99.4
901	98.5
1020	97.5
1513	94.1
2002	91.7
2502	89.6
3002	87.9
4123	84.8
5000	82.8
5314	82.1
5489	81.7
6073	80.6
7649	77.8
10440	73.6
15872	67.0
16122	66.7

DISTANCE TO dB CONTOURS:

Lmax Noise Contour Value (dBA)	Contour Distance (feet)
105	401
100	745
95	1,397
90	2,438
85	4,075
80	12,150
75	19,912
70	27,699
65	35,496
60	37,186
55	38,956
50	40,810
45	42,752
40	44,787
35	46,919
30	49,152
25	51,346

Notes: Drop-off calculations include atmospheric absorption at 0.21 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-25 MODELED NOISE LEVELS, APPROACH POWER, 200 KNOTS

==> Basic sound level drop-off rate: 5.30 dB/doubling  
 ==> Atmospheric absorption coefficient: 0.21 dB/100 meters  
 ==> Reference Level (SEL, Lmax, Leq): 108.36 Lmax dBA  
 ==> Distance for Reference Noise Level: 315 Feet

DISTANCE ATTENUATION:

Receptor Distance (feet)	Lmax Value (dBA) at Receptor
100	117.3
300	108.7
361	107.3
500	104.7
539	104.1
583	103.5
632	102.8
707	101.9
808	100.8
901	99.9
1020	98.9
1513	95.6
2002	93.1
2502	91.1
3002	89.4
4123	86.3
5000	84.2
5314	83.6
5489	83.2
6073	82.0
7649	79.3
10440	75.1
15872	68.4
16122	68.2

DISTANCE TO dB CONTOURS:

Lmax Noise Contour Value (dBA)	Contour Distance (feet)
105	482
100	896
95	1,597
90	2,886
85	4,815
80	12,579
75	20,374
70	28,178
65	35,985
60	37,698
55	39,492
50	41,372
45	43,341
40	45,404
35	47,565
30	49,829
25	52,047

Notes: Drop-off calculations include atmospheric absorption at 0.21 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-26      MODELED NOISE LEVELS, CRUISE POWER, 200 KNOTS

⇒ Basic sound level drop-off rate:                    5.40 dB/doubling  
 ⇒ Atmospheric absorption coefficient:                0.24 dB/100 meters  
 ⇒ Reference Level (SEL, L<sub>max</sub>, L<sub>eq</sub>):                93.43 L<sub>max</sub> dBA  
 ⇒ Distance for Reference Noise Level:                315 Feet

DISTANCE ATTENUATION:

Receptor Distance (feet)	L <sub>max</sub> Value (dBA) at Receptor
100	102.5
300	93.8
361	92.3
500	89.7
539	89.1
583	88.4
632	87.8
707	86.8
808	85.7
901	84.8
1020	83.8
1513	80.3
2002	77.8
2502	75.7
3002	73.9
4123	70.6
5000	68.5
5314	67.8
5489	67.4
6073	66.2
7649	63.2
10440	58.7
15872	51.5
16122	51.2

DISTANCE TO dB CONTOURS:

L <sub>max</sub> Noise Contour Value (dBA)	Contour Distance (feet)
105	73
100	138
95	258
90	482
85	884
80	1,556
75	2,621
70	4,251
65	11,433
60	18,242
55	25,063
50	31,890
45	33,380
40	34,939
35	36,571
30	38,279
25	39,989

Notes: Drop-off calculations include atmospheric absorption at 0.24 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-27 MODELED NOISE LEVELS, CRUISE POWER, 250 KNOTS

⇒ Basic sound level drop-off rate:	5.40 dB/doubling
⇒ Atmospheric absorption coefficient:	0.24 dB/100 meters
⇒ Reference Level (SEL, Lmax, Leq):	94.63 Lmax dBA
⇒ Distance for Reference Noise Level:	315 Feet

DISTANCE ATTENUATION:

Receptor Distance (feet)	Lmax Value (dBA) at Receptor
100	103.7
300	95.0
361	93.5
500	90.9
539	90.3
583	89.6
632	89.0
707	88.0
808	86.9
901	86.0
1020	85.0
1513	81.5
2002	79.0
2502	76.9
3002	75.1
4123	71.8
5000	69.7
5314	69.0
5489	68.6
6073	67.4
7649	64.4
10440	59.9
15872	52.7
16122	52.4

DISTANCE TO dB CONTOURS:

Lmax Noise Contour Value (dBA)	Contour Distance (feet)
105	85
100	161
95	301
90	557
85	1,016
80	1,854
75	3,021
70	4,927
65	11,746
60	18,576
55	25,408
50	32,242
45	33,747
40	35,324
35	36,973
30	38,700
25	40,425

Notes: Drop-off calculations include atmospheric absorption at 0.24 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-28      MODELED NOISE LEVELS, TAKEOFF POWER, 150 KNOTS

==> Basic sound level drop-off rate:                      5.80 dB/doubling  
 ==> Atmospheric absorption coefficient:                      0.2 dB/100 meters  
 ==> Reference Level (SEL, Lmax, Leq):                      113.45 Lmax dBA  
 ==> Distance for Reference Noise Level:                      315 Feet

DISTANCE ATTENUATION:

Receptor Distance (feet)	Lmax Value (dBA) at Receptor
100	123.2
300	113.9
361	112.3
500	109.5
539	108.8
583	108.1
632	107.4
707	106.4
808	105.3
901	104.3
1020	103.2
1513	99.6
2002	96.9
2502	94.8
3002	92.9
4123	89.6
5000	87.5
5314	86.8
5489	86.4
6073	85.2
7649	82.3
10440	78.0
15872	71.2
16122	70.9

DISTANCE TO dB CONTOURS:

Lmax Noise Contour Value (dBA)	Contour Distance (feet)
105	831
100	1,460
95	2,463
90	4,037
85	5,629
80	13,989
75	22,241
70	30,467
65	38,683
60	40,522
55	42,449
50	44,468
45	46,582
40	48,797
35	51,117
30	53,548
25	55,925

Notes: Drop-off calculations include atmospheric absorption at 0.2 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-29 MODELED NOISE LEVELS, TAKEOFF POWER, 175 KNOTS

⇒ Basic sound level drop-off rate:	5.80 dB/doubling
⇒ Atmospheric absorption coefficient:	0.2 dB/100 meters
⇒ Reference Level (SEL, Lmax, Leq):	114.23 Lmax dBA
⇒ Distance for Reference Noise Level:	315 Feet

DISTANCE ATTENUATION:

Receptor Distance (feet)	Lmax Value (dBA) at Receptor
100	124.0
300	114.6
361	113.1
500	110.3
539	109.6
583	108.9
632	108.2
707	107.2
808	106.0
901	105.1
1020	104.0
1513	100.4
2002	97.7
2502	95.6
3002	93.7
4123	90.4
5000	88.2
5314	87.5
5489	87.2
6073	86.0
7649	83.1
10440	78.8
15872	71.9
16122	71.7

DISTANCE TO dB CONTOURS:

Lmax Noise Contour Value (dBA)	Contour Distance (feet)
105	908
100	1,562
95	2,602
90	4,211
85	12,667
80	20,826
75	29,006
70	37,195
65	38,964
60	40,817
55	42,758
50	44,791
45	46,921
40	49,152
35	51,489
30	53,938
25	56,328

Notes: Drop-off calculations include atmospheric absorption at 0.2 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-30 MODELED NOISE LEVELS, TAKEOFF POWER, 250 KNOTS

⇒ Basic sound level drop-off rate:	5.80 dB/doubling
⇒ Atmospheric absorption coefficient:	0.2 dB/100 meters
⇒ Reference Level (SEL, Lmax, Leq):	116.11 Lmax dBA
⇒ Distance for Reference Noise Level:	315 Feet

DISTANCE ATTENUATION:

Receptor Distance (feet)	Lmax Value (dBA) at Receptor
100	125.8
300	116.5
361	114.9
500	112.1
539	111.5
583	110.8
632	110.1
707	109.1
808	107.9
901	107.0
1020	105.8
1513	102.2
2002	99.6
2502	97.4
3002	95.6
4123	92.3
5000	90.1
5314	89.4
5489	89.0
6073	87.8
7649	84.9
10440	80.6
15872	73.8
16122	73.5

DISTANCE TO dB CONTOURS:

Lmax Noise Contour Value (dBA)	Contour Distance (feet)
105	1,108
100	1,942
95	3,122
90	5,029
85	13,240
80	21,444
75	29,648
70	37,851
65	39,651
60	41,536
55	43,511
50	45,580
45	47,748
40	50,018
35	52,397
30	54,888
25	57,313

Notes: Drop-off calculations include atmospheric absorption at 0.2 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-31 MODELED NOISE LEVELS, IRP POWER, 300 KNOTS

=> Basic sound level drop-off rate: 5.80 dB/doubling  
 => Atmospheric absorption coefficient: 0.2 dB/100 meters  
 => Reference Level (SEL, Lmax, Leq): 117.03 Lmax dBA  
 => Distance for Reference Noise Level: 315 Feet

DISTANCE ATTENUATION:

Receptor Distance (feet)	Lmax Value (dBA) at Receptor
100	126.8
300	117.4
361	115.9
500	113.1
539	112.4
583	111.7
632	111.0
707	110.0
808	108.8
901	107.9
1020	106.8
1513	103.2
2002	100.5
2502	98.4
3002	96.5
4123	93.2
5000	91.0
5314	90.3
5489	90.0
6073	88.8
7649	85.9
10440	81.6
15872	74.7
16122	74.5

DISTANCE TO dB CONTOURS:

Lmax Noise Contour Value (dBA)	Contour Distance (feet)
105	1,212
100	2,086
95	3,313
90	5,257
85	13,529
80	21,754
75	29,967
70	38,176
65	39,991
60	41,893
55	43,885
50	45,972
45	48,158
40	50,448
35	52,846
30	55,359
25	57,801

Notes: Drop-off calculations include atmospheric absorption at 0.2 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-32      MODELED NOISE LEVELS, IRP POWER, 350 KNOTS

=> Basic sound level drop-off rate:                      5.80 dB/doubling  
 => Atmospheric absorption coefficient:                      0.2 dB/100 meters  
 => Reference Level (SEL, Lmax, Leq):                      117.84 Lmax dBA  
 => Distance for Reference Noise Level:                      315 Feet

DISTANCE ATTENUATION:

Receptor Distance (feet)	Lmax Value (dBA) at Receptor
100	127.6
300	118.3
361	116.7
500	113.9
539	113.2
583	112.5
632	111.8
707	110.8
808	109.7
901	108.7
1020	107.6
1513	104.0
2002	101.3
2502	99.2
3002	97.3
4123	94.0
5000	91.9
5314	91.1
5489	90.8
6073	89.6
7649	86.7
10440	82.4
15872	75.6
16122	75.3

DISTANCE TO dB CONTOURS:

Lmax Noise Contour Value (dBA)	Contour Distance (feet)
105	1,385
100	2,359
95	3,905
90	5,466
85	13,790
80	22,030
75	30,251
70	38,464
65	40,293
60	42,209
55	44,216
50	46,319
45	48,521
40	50,829
35	53,246
30	55,777
25	58,235

Notes: Drop-off calculations include atmospheric absorption at 0.2 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-33      MODELED NOISE LEVELS, AFTERBURNER TAKEOFF, 150 KNOTS

⇒ Basic sound level drop-off rate:                      6.56 dB/doubling  
 ⇒ Atmospheric absorption coefficient:                0.1 dB/100 meters  
 ⇒ Reference Level (SEL, Lmax, Leq):                119.26 Lmax dBA  
 ⇒ Distance for Reference Noise Level:                315 Feet

DISTANCE ATTENUATION:

Receptor Distance (feet)	Lmax Value (dBA) at Receptor
100	130.2
300	119.7
361	118.0
500	114.8
539	114.1
583	113.4
632	112.6
707	111.5
808	110.2
901	109.1
1020	107.9
1513	104.0
2002	101.2
2502	99.0
3002	97.1
4123	93.8
5000	91.7
5314	91.0
5489	90.6
6073	89.5
7649	86.8
10440	83.0
15872	77.4
16122	77.2

DISTANCE TO dB CONTOURS:

Lmax Noise Contour Value (dBA)	Contour Distance (feet)
105	1,387
100	2,304
95	3,785
90	5,562
85	22,381
80	38,890
75	55,343
70	71,775
65	75,362
60	79,128
55	83,083
50	87,235
45	91,595
40	96,173
35	100,979
30	106,026
25	111,120

Notes: Drop-off calculations include atmospheric absorption at 0.1 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-34      MODELED NOISE LEVELS, AFTERBURNER TAKEOFF, 175 KNOTS

⇒ Basic sound level drop-off rate:                      6.56 dB/doubling  
 ⇒ Atmospheric absorption coefficient:                      0.1 dB/100 meters  
 ⇒ Reference Level (SEL, L<sub>max</sub>, L<sub>eq</sub>):                      120.04 L<sub>max</sub> dBA  
 ⇒ Distance for Reference Noise Level:                      315 Feet

DISTANCE ATTENUATION:

Receptor Distance (feet)	L <sub>max</sub> Value (dBA) at Receptor
100	131.0
300	120.5
361	118.7
500	115.6
539	114.9
583	114.1
632	113.4
707	112.3
808	111.0
901	109.9
1020	108.7
1513	104.8
2002	102.0
2502	99.8
3002	97.9
4123	94.5
5000	92.4
5314	91.8
5489	91.4
6073	90.3
7649	87.6
10440	83.8
15872	78.2
16122	78.0

DISTANCE TO dB CONTOURS:

L <sub>max</sub> Noise Contour Value (dBA)	Contour Distance (feet)
105	1,489
100	2,454
95	3,994
90	5,845
85	22,852
80	39,407
75	55,880
70	72,323
65	75,937
60	79,732
55	83,717
50	87,901
45	92,294
40	96,907
35	101,750
30	106,835
25	111,965

Notes: Drop-off calculations include atmospheric absorption at 0.1 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

TABLE F-35      MODELED NOISE LEVELS, AFTERBURNER POWER, 350 KNOTS

==> Basic sound level drop-off rate:                      6.56 dB/doubling  
 ==> Atmospheric absorption coefficient:                      0.1 dB/100 meters  
 ==> Reference Level (SEL, Lmax, Leq):                      123.54 Lmax dBA  
 ==> Distance for Reference Noise Level:                      315 Feet

DISTANCE ATTENUATION:

Receptor Distance (feet)	Lmax Value (dBA) at Receptor
100	134.5
300	124.0
361	122.2
500	119.1
539	118.4
583	117.6
632	116.9
707	115.8
808	114.5
901	113.4
1020	112.2
1513	108.3
2002	105.5
2502	103.3
3002	101.4
4123	98.0
5000	95.9
5314	95.3
5489	94.9
6073	93.8
7649	91.1
10440	87.3
15872	81.7
16122	81.5

DISTANCE TO dB CONTOURS:

Lmax Noise Contour Value (dBA)	Contour Distance (feet)
105	2,094
100	3,339
95	5,312
90	21,954
85	38,419
80	54,852
75	71,272
70	74,834
65	78,574
60	82,501
55	86,625
50	90,954
45	95,500
40	100,272
35	105,284
30	110,546
25	115,837

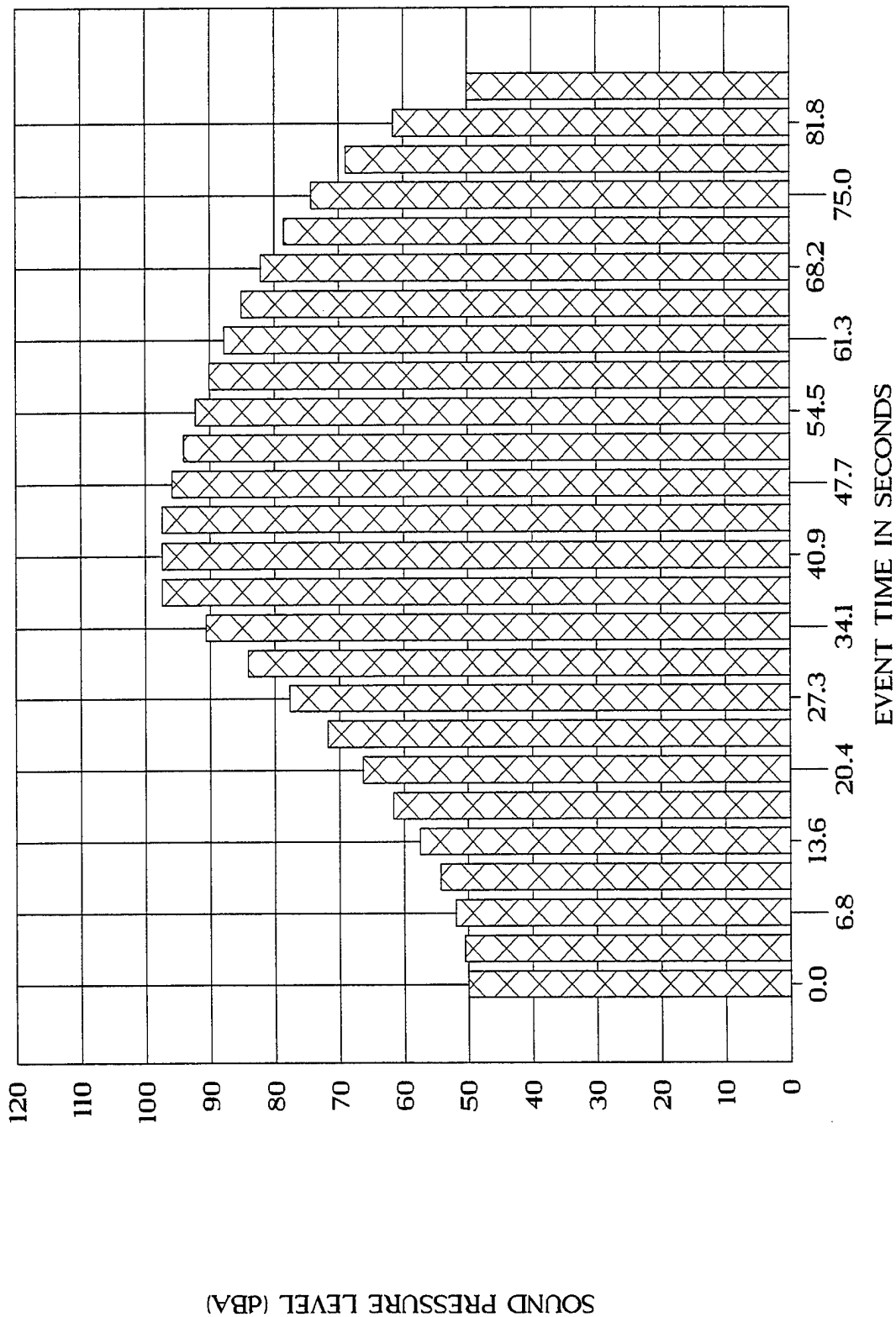
Notes: Drop-off calculations include atmospheric absorption at 0.1 dB/100 meters, centered at the reference distance.

Except for sounds with highly distinctive tonal characteristics, noise from a particular source will not be identifiable when its incremental noise level contribution is significantly less than background noise levels.

Contour distance calculations are most accurate within the decibel range of the direct attenuation calculations.

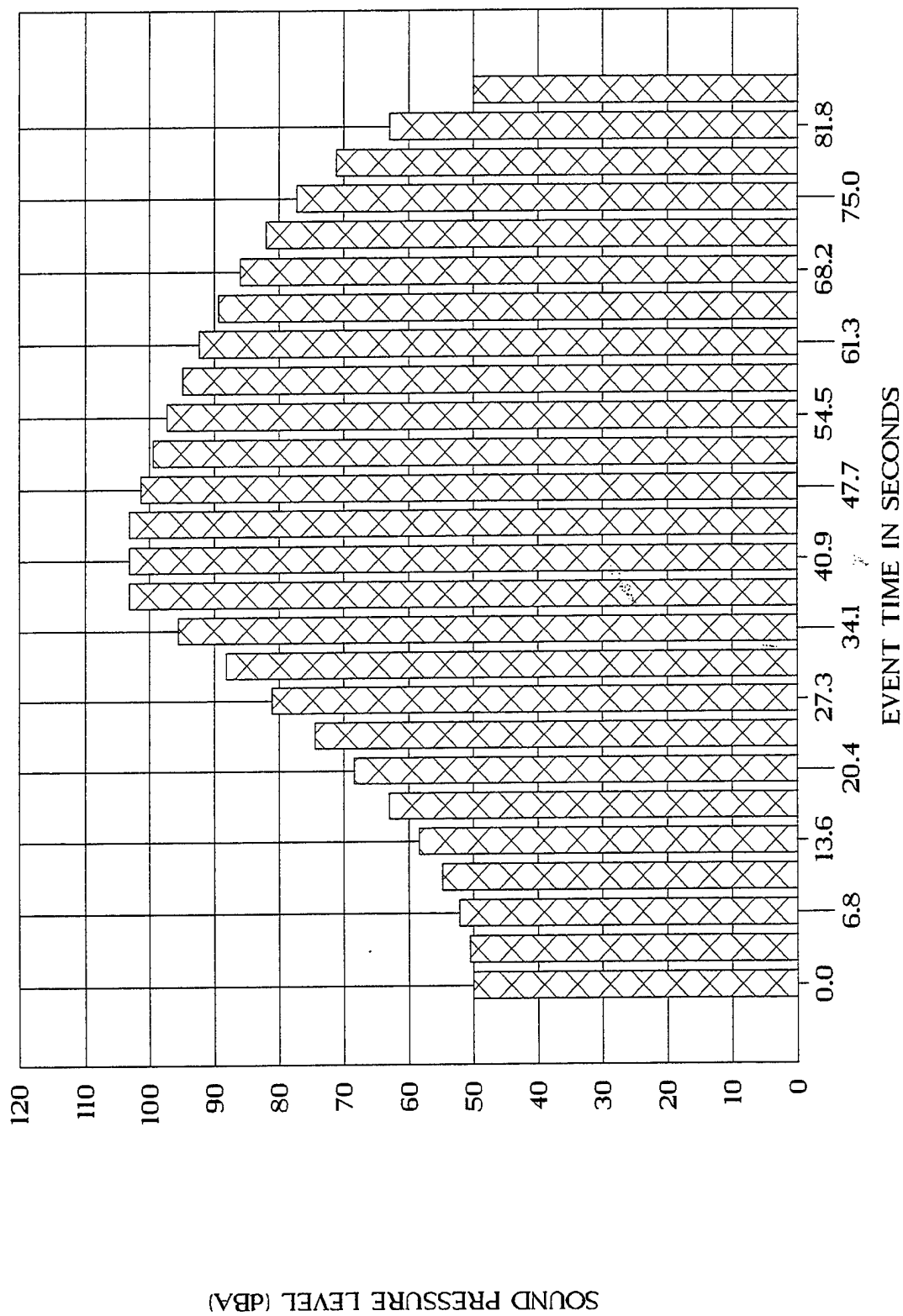
# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

APPROACH POWER, 150 KNOTS, 1020 FEET



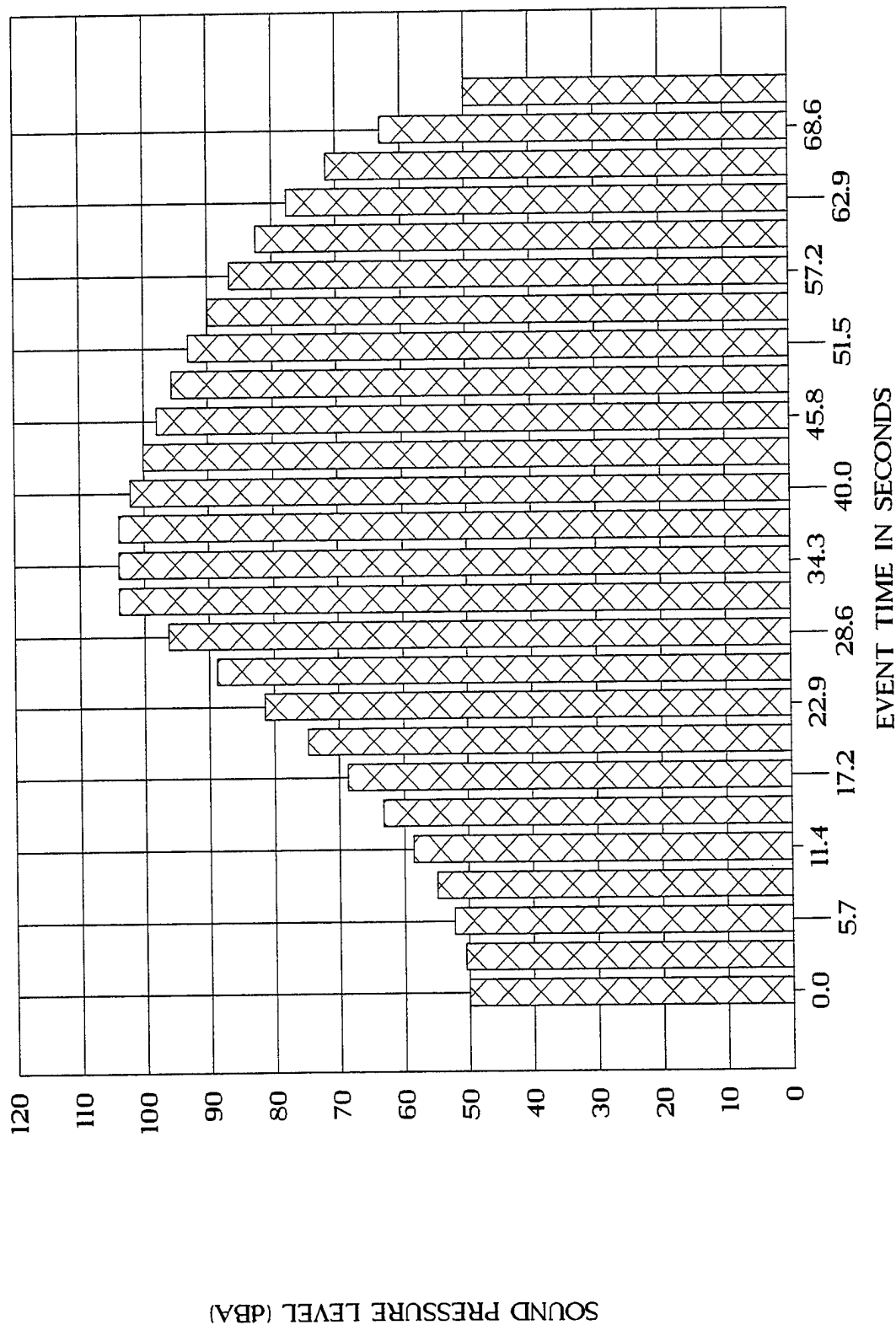
# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

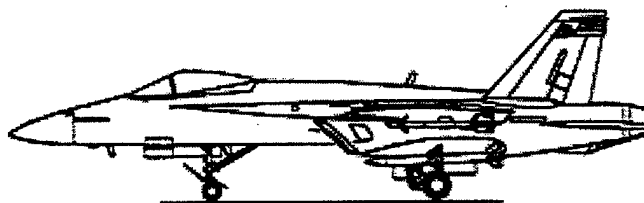
TAKEOFF POWER, 150 KNOTS, 1020 FEET



# F/A-18 AIRCRAFT FLYOVER NOISE EVENT

TAKEOFF POWER, 175 KNOTS, 1020 FEET





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APPENDIX G  
BIOLOGICAL RESOURCES

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US FISH AND WILDLIFE CONSULTATION

G-1

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IN REPLY REFER TO:

## United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office

3310 El Camino Avenue, Suite 130

Sacramento, California 95821

1-1-97-I-2221

October 20, 1997

Department of the Navy  
Engineering Field Activity West  
Naval Facilities Engineering Command  
900 Commodore Drive  
San Bruno, California 94066

Subject: Review of the Notice of Preparation of an Environmental Impact  
Statement for West Coast Basing of Navy Aircraft at Lemoore Naval Air  
Station, Kings and Fresno Counties, California

Mr. Sam Dennis:

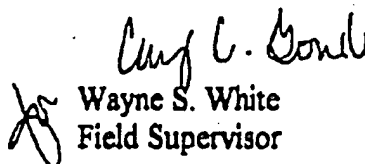
This responds to your September 25, 1997, request for a review of the Notice of Preparation for an Environmental Impact Statement for West Coast Basing of Navy Aircraft at Lemoore Naval Air Station, Kings and Fresno Counties, California. The attached enclosures are intended to assist you in the early environmental review of your proposal. Consultation with the U.S. Fish and Wildlife Service (Service) may be required under provisions of the Fish and Wildlife Coordination Act or Endangered Species Act of 1973, as amended, if project activities may affect federally listed species or impact jurisdictional wetlands.

Enclosure A provides a list of sensitive species that may occur in or near the project site and general survey guidelines. The Service recommends that surveys be completed by a qualified biologist on the proposed project site to confirm the presence or absence of special status species and their habitats. Enclosure B recommends general guidelines for identifying and mitigating project impacts to fish, wildlife, and their habitats. The Council on Environmental Quality developed regulations for implementing the National Environmental Policy Act (NEPA), and defines mitigation to include: (1) avoiding the impact; (2) minimizing the impact; (3) rectifying the impact; (4) reducing or eliminating the impact over time; and (5) compensating for impacts. The Service supports and adopts this definition of mitigation and considers the specific elements to represent the desirable sequence of steps in the mitigation planning process. Accordingly, we maintain that the best way to mitigate for the adverse biological effect is avoidance when possible.

Mr. Sam Dennis

We encourage you to use these guidelines to develop a comprehensive environmental document that addresses these needs. If you have any questions regarding these comments, please contact Mr. Don Hovik at (916) 979-2732, extension 345.

Sincerely,

  
Wayne S. White  
Field Supervisor

Enclosures

## ENCLOSURE A

Endangered and Threatened Species that May Occur In or be Affected by  
Projects in the Area of the Following California County or Counties

October 13, 1997

## FRESNO COUNTY

*Listed Species*

## Mammals

- giant kangaroo rat, *Dipodomys ingens* (E)
- Fresno kangaroo rat, *Dipodomys nitratoides exilis* (E)
- Fresno kangaroo rat critical habitat, *Dipodomys nitratoides exilis* (E)
- Tipton kangaroo rat, *Dipodomys nitratoides nitratoides* (E)
- San Joaquin kit fox, *Vulpes macrotis mutica* (E)

## Birds

- American peregrine falcon, *Falco peregrinus anatum* (E)
- California condor, *Gymnogyps californianus* (E)
- Aleutian Canada goose, *Branta canadensis leucoparela* (T)
- bald eagle, *Haliaeetus leucocephalus* (T)

## Reptiles

- blunt-nosed leopard lizard, *Gambelia (=Crotaphytus) silus* (E)
- giant garter snake, *Thamnophis gigas* (T)

## Amphibians

- California red-legged frog, *Rana aurora draytonii* (T)

## Fish

- delta smelt, *Hypomesus transpacificus* (T)
- Paiute cutthroat trout, *Oncorhynchus (=Salmo) clarki selenis* (T)

## Invertebrates

- vernal pool fairy shrimp, *Branchinecta lynchi* (T)
- valley elderberry longhorn beetle, *Desmocerus californicus dimorphus* (T)

## Plants

- California jewelflower, *Caulanthus californicus* (E)
- palmate-bracted bird's-beak, *Cordylanthus palmatus* (E)
- San Joaquin woolly-threads, *Lambertia congonii* (E)
- Hartweg's golden sunburst, *Pseudobahia bahiifolia* (E)

## FRESNO COUNTY

### Listed Species

#### Plants

- San Benito evening-primrose, *Camissonia benthamiana* (T)
- flashy owl's-clover, *Castilleja campestris* ssp. *succulenta* (T)
- Hoover's wooly-star, *Eriastrum hooveri* (T)
- San Joaquin Valley Orcutt grass, *Orcuttia inaequalis* (T)
- San Joaquin adobe sunburst, *Pseudobahia peirsonii* (T)
- Greene's tuctoria, *Tuctoria greenii* (E)

### Proposed Species

#### Fish

- Central Valley steelhead, *Oncorhynchus mykiss* (PE)
- Sacramento splittail, *Pogonichthys macrolepidotus* (PT)

#### Plants

- Mariposa pussy-pawa, *Calyptridium pulchellum* (PE)
- carpenteria, *Carpenteria californica* (PT)

### Candidate Species

#### Mammals

- San Joaquin Valley woodrat, *Neotoma fuscipes riparia* (C)

#### Birds

- mountain plover, *Charadrius montanus* (C)

#### Amphibians

- California tiger salamander, *Ambystoma californiense* (C)

### Species of Concern

#### Mammals

- Nelson's antelope ground squirrel, *Ammospermophilus nelsoni* (SC)
- short-nosed kangaroo rat, *Dipodomys nitratoides brevinasus* (SC)
- spotted bat, *Euderma maculatum* (SC)
- greater western mastiff-bat, *Eumops perotis californicus* (SC)
- California wolverine, *Gulo gulo luteus* (SC)

## FRESNO COUNTY

## Species of Concern

## Mammals

- Pacific fisher, *Martes pennanti pacifica* (SC)
- small-footed myotis bat, *Myotis ciliolabrum* (SC)
- long-eared myotis bat, *Myotis evotis* (SC)
- fringed myotis bat, *Myotis thysanodes* (SC)
- long-legged myotis bat, *Myotis volans* (SC)
- Yuma myotis bat, *Myotis yumanensis* (SC)
- Southern grasshopper mouse, *Onychomys torridus ramona* (SC)
- Tulare grasshopper mouse, *Onychomys torridus tularensis* (SC)
- California bighorn sheep, *Ovis canadensis californiana* (SC)
- San Joaquin pocket mouse, *Perognathus inornatus* (SC)
- pale Townsend's big-eared bat, *Plecotus townsendii pallascens* (SC)
- Pacific western big-eared bat, *Plecotus townsendii townsendii* (SC)
- Mt. Lyell shrew, *Sorex lyelli* (SC)
- Sierra Nevada red fox, *Vulpes vulpes necator* (SC)

## Birds

- northern goshawk, *Accipiter gentilis* (SC)
- tricolored blackbird, *Agelaius tricolor* (SC)
- western burrowing owl, *Athene cucularia hypugae* (SC)
- Swainson's hawk, *Buteo Swainsoni* (SC)
- ferruginous hawk, *Buteo regalis* (SC)
- little willow flycatcher, *Empidonax traillii brewsteri* (SC)
- white-faced ibis, *Plegadis chihi* (SC)
- California spotted owl, *Strix occidentalis occidentalis* (SC)

## Reptiles

- silvery legless lizard, *Anniella pulchra pulchra* (SC)
- northwestern pond turtle, *Clemmys marmorata marmorata* (SC)
- southwestern pond turtle, *Clemmys marmorata pallida* (SC)
- San Joaquin whipsnake, *Masticophis flagellum ruddocki* (SC)
- California horned lizard, *Phrynosoma coronatum frontale* (SC)

## Amphibians

- Yosemite toad, *Bufo canorus* (SC)
- Mount Lyell salamander, *Hydromantes platycephalus* (SC)

## FRESNO COUNTY

*Species of Concern*

## Amphibians

- foothill yellow-legged frog, *Rana boylei* (SC)
- mountain yellow-legged frog, *Rana muscosa* (SC)
- western spadefoot toad, *Scaphiopus hammondi* (SC)

## Fish

- green sturgeon, *Acipenser medirostris* (SC)
- river lamprey, *Lampetra ayresii* (SC)
- Kern brook lamprey, *Lampetra hubbsi* (SC)
- Pacific lamprey, *Lampetra tridentata* (SC)
- longfin smelt, *Spirinchus thaleichthys* (SC)

## Invertebrates

- Ciervo aegialian scarab beetle, *Aegialia concinna* (SC)
- San Joaquin tiger beetle, *Cicindela tranquebarica* ssp (SC)
- San Joaquin dune beetle, *Coelus gracilis* (SC)
- Kings Canyon cryptochian caddisfly, *Cryptochia excelsa* (SC)
- Woolly hydroporus diving beetle, *Hydroporus diving beetle* (SC)
- Hopping's blister beetle, *Lytta hoppingi* (SC)
- moetan blister beetle, *Lytta moesta* (SC)
- molestan blister beetle, *Lytta molesta* (SC)
- Morrison's blister beetle, *Lytta morrisoni* (SC)
- Dry Creek cliff strider bug, *Oravelia pege* (SC)
- Bohart's blue butterfly, *Philotiella speciosa bohartorum* (SC)
- Sierra pygmy grasshopper, *Tetrix sierrana* (SC)

## Plants

- obovate-leaved thormint, *Acanthomintha obovata* ssp. *obovata* (SC)
- forked fiddleneck, *Amsinckia vernicosa* var. *furcata* (SC)
- Bodie Hills rock-cress, *Arabis bodiensis* (SC)
- Raven's milk-vetch, *Astragalus monoensis* var. *ravenii* (SC)
- heartscale, *Atriplex cordulata* (SC)
- brittlescale, *Atriplex depressa* (SC)
- Lost Hills saltbush, *Atriplex vallicola* (SC)
- South Coast Range morning-glory, *Calystegia collina* ssp. *venusta* (SC)
- Mono Hot Springs evening-primrose, *Camissonia sierrae* ssp. *alticola* (SC)

## FRESNO COUNTY

*Species of Concern*

## Plants

- San Benito spineflower, *Chorizanthe biloba* var. *immemora* (SC)  
 Fresno County bird's-beak, *Cordylanthus tenuis* ssp. *barbatus* (SC)  
 recurved larkspur, *Delphinium recurvatum* (SC)  
 mouse buckwheat, *Eriogonum nudum* var. *murinum* (SC)  
 spiny-sealed coyote-thistle, *Eryngium spinosepalum* (SC)  
 hollisteria, *Hollisteria lanata* (SC)  
 delta tula-pea, *Lathyrus jepsonii* var. *jepsonii* (SC)  
 rayless layia, *Layia discolor* (SC)  
 Panoche peppergoose, *Lepidium jaredii* var. *album* (SC)  
 long-petaled lewisia, *Lewisia longipetala* (SC)  
 orange lupine, *Lupinus citrinus* var. *citrinus* (SC)  
 valley sagittaria, *Sagittaria sanfordii* (SC)  
 parasol clover, *Trifolium bolanderi* (SC)  
 lesser saltscale, *Atriplex minuscule* (SC)  
 pale-yellow layia, *Layia heterotricha* (SC)

## KINGS COUNTY

*Listed Species*

## Mammals

- giant kangaroo rat, *Dipodomys ingens* (E)  
 Fresno kangaroo rat, *Dipodomys nitratoides exilis* (E)  
 Tipton kangaroo rat, *Dipodomys nitratoides nitratoides* (E)  
 San Joaquin kit fox, *Vulpes macrotis mutica* (E)

## Birds

- American peregrine falcon, *Falco peregrinus anatum* (E)  
 California condor, *Gymnogyps californianus* (E)  
 Aleutian Canada goose, *Branta canadensis leucopareta* (T)  
 bald eagle, *Haliaeetus leucocephalus* (T)

## Reptiles

- blunt-nosed leopard lizard, *Gambelia (=Crotaphytus) silus* (E)  
 giant garter snake, *Thamnophis gigas* (T)

**KINGS COUNTY****Listed Species****Amphibians**California red-legged frog, *Rana aurora draytonii* (T)**Fish**delta smelt, *Hypomesus transpacificus* (T)**Invertebrates**vernal pool fairy shrimp, *Branchinecta lynchi* (T)valley elderberry longhorn beetle, *Desmocerus californicus dimorphus* (T)**Plants**San Joaquin woolly-threads, *Lambertia concolorii* (E)Hoover's woolly-star, *Eriastrum hooveri* (T)California jewelflower, *Caulanthus californicus* (E)**Proposed Species****Fish**Sacramento splittail, *Pogonichthys macrolepidotus* (PT)**Candidate Species****Birds**mountain plover, *Charadrius montanus* (C)**Amphibians**California tiger salamander, *Ambystoma californiense* (C)**Species of Concern****Mammals**Nelson's antelope ground squirrel, *Ammospermophilus nelsoni* (SC)short-nosed kangaroo rat, *Dipodomys nitratoides brevinasus* (SC)greater western mastiff-bat, *Eumops perotis californicus* (SC)small-footed myotis bat, *Myotis ciliolabrum* (SC)long-eared myotis bat, *Myotis evotis* (SC)fringed myotis bat, *Myotis thysanodes* (SC)long-legged myotis bat, *Myotis volans* (SC)

## KINGS COUNTY

## Species of Concern

## Mammals

- Yuma myotis bat, *Myotis yumanensis* (SC)
- Southern grasshopper mouse, *Onychomys torridus ramona* (SC)
- Tulare grasshopper mouse, *Onychomys torridus tularensis* (SC)
- San Joaquin pocket mouse, *Perognathus inornatus* (SC)
- Pacific western big-eared bat, *Plecotus townsendi townsendi* (SC)
- Sierra Nevada red fox, *Vulpes vulpes nescator* (SC)

## Birds

- tricolored blackbird, *Agelaius tricolor* (SC)
- western burrowing owl, *Athene cunicularia hypugae* (SC)
- Swainson's hawk, *Buteo Swainsoni* (SC)
- ferruginous hawk, *Buteo regalis* (SC)
- little willow flycatcher, *Empidonax traillii brewsteri* (SC)
- white-faced ibis, *Plegadis chihi* (SC)
- San Joaquin LeConte's thrasher, *Toxostoma lecontei macmillanorum* (SC)

## Reptiles

- slivery legless lizard, *Anniella pulchra pulchra* (SC)
- northwestern pond turtle, *Emmys marmorata marmorata* (SC)
- southwestern pond turtle, *Emmys marmorata pallida* (SC)
- San Joaquin whipsnake, *Masticophis flagellum ruddocki* (SC)
- California horned lizard, *Phrynosoma coronatum frontale* (SC)

## Amphibians

- foothill yellow-legged frog, *Rana boylei* (SC)
- western spadefoot toad, *Scaphiopus hammondi* (SC)

## Fish

- Kern brook lamprey, *Lampetra hubbsi* (SC)

## Invertebrates

- Clervo aeglian scarab beetle, *Aegialia concinna* (SC)
- San Joaquin dune beetle, *Coelus gracilis* (SC)
- molestan blister beetle, *Lytta molesta* (SC)
- Doyen's trigonascuta dune weevil, *Trigonascuta doyeri* (SC)

**KINGS COUNTY****Species of Concern****Plants**

forked fiddleneck, *Amsinckia vernicosa* var. *furcata* (SC)

heartscale, *Atriplex cordulata* (SC)

Lost Hills saltbush, *Atriplex vallicola* (SC)

slough thistle, *Cirsium crassicaule* (SC)

recurved larkspur, *Delphinium recurvatum* (SC)

pale-yellow layia, *Layia heterotricha* (SC)

**KEY:**

- |                                |   |
|--------------------------------|---|
| (E) <i>Endangered</i>          | Listed (in the Federal Register) as being in danger of extinction.  |
| (T) <i>Threatened</i>          | Listed as likely to become endangered within the foreseeable future.  |
| (P) <i>Proposed</i>            | Officially proposed (in the Federal Register) for listing as endangered or threatened.                                |
| (C) <i>Candidate</i>           | Candidate to become a <i>proposed</i> species.  |
| (SC) <i>Species of Concern</i> | May be endangered or threatened. Not enough biological information has been gathered to support listing at this time. |
| (*) <i>Possibly extinct</i>    |   |
| <i>Critical Habitat</i>        | Area essential to the conservation of a species.  |

## ENCLOSURE B

**Endangered Species.** This enclosure identifies those listed, proposed, and/or candidate species that may occur in the proposed project area. Information and maps concerning candidate species in California may be obtained from the California Natural Diversity Data Base, a program administered by the California Department of Fish and Game. Requests for information should be addressed to the Marketing Manager, California Department of Fish and Game, Natural Diversity Data Base, 1416 Ninth Street, Sacramento, California 95814. The marketing manager may be contacted by calling (916) 324-0562. You may request additional information from the Chief, California Department of Fish and Game, Non-Game Heritage Program, at (916) 324-8348.

Listed species are fully protected under the mandates of the Endangered Species Act (Act), as amended. Section 9 of the Act and its implementing regulations prohibit the "take" of a federally listed fish and wildlife species by any person, as defined by the Act. Take is defined by the Act "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such species. Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR § 17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures. If a Federal agency is involved with the permitting, funding, or carrying out of this project, initiation of formal consultation is required between that agency and the Service pursuant to section 7 of the Act if it is determined that the proposed project may affect a federally listed species. Federal agencies must confer if they determine that the continued existence of a proposed species may be jeopardized by the project. Such consultation or conference could result in a biological opinion that addresses anticipated effects of the project to listed and proposed species. The biological opinion may authorize a limited level of incidental take for federally listed species. If a Federal agency is not involved with the project, and federally listed species may be taken as part of the project, then an "incidental take" permit pursuant to section 10(a) of the Act should be obtained. The Service may issue such a permit upon completion by the permit applicant of a satisfactory conservation plan for the listed species that may be affected by the project.

We recommend that appropriately designed surveys for listed, proposed, or candidate species be undertaken by qualified biologists. Surveys for plants should not be restricted to the identified species; instead, a complete botanical inventory of the project site should be conducted. Botanical surveys should be conducted at intervals throughout the spring and summer, in order to maximize the likelihood of encountering each species during the season most appropriate for accurate identification. Surveys should be based on field inspection, and not on prediction of occurrence based on habitat or physical features of the site. Guidelines for conducting adequate botanical surveys are available from the Natural Heritage Division of the California Department of Fish and Game at (916) 322-2493.

The results of all biological surveys should be published in the environmental impact report. The report should include a brief discussion of survey methods (including sampling methods and timing of surveys), results (including a list of all species encountered as well as maps of vegetation types, populations of plant species, and breeding, nesting or burrowing sites or other habitat components important to animal species), and conclusions. If it is concluded that a given sensitive species is not present, the justification for this conclusion should be fully explained.

Should these surveys determine that listed, proposed, or candidate species may be affected by the proposed project, the Service recommends that the project proponent, in consultation with this office and the California Department of Fish and Game, develop a plan that mitigates for the project's direct and indirect impacts to these species and compensates for project-related loss of habitat. The mitigation plan also should be included in the environmental impact report.

One of the benefits of considering candidate species as well as listed and proposed species early in the planning process is that by exploring alternatives, it may be possible to avoid conflicts that could develop, should a candidate species become listed before the project is complete. In addition, in instances where the Service addresses proposed projects under its Fish and Wildlife Coordination Act authority, we must also analyze the impacts on candidate species and make recommendations to mitigate any adverse effects.

## ENCLOSURE C

The goal of the U.S. Fish and Wildlife Service is to conserve, protect and enhance fish, wildlife, and their habitats by timely and effective provision of fish and wildlife information and recommendations. To assist us in accomplishing this goal, we would like to see the items described below discussed in your environmental documents for the proposed project.

**Project Description.** The document should very clearly state the purposes of, and document the needs for, the proposed project so that the capabilities of the various alternatives to meet the purposes and needs can be readily determined.

A thorough description of all permanent and temporary facilities to be constructed and work to be done as a part of the project should be included. The document should identify any new access roads, equipment staging areas, and gravel processing facilities which are needed. Figures accurately depicting proposed project features in relation to natural features (such as streams, wetlands, riparian areas, and other habitat types) in the project area should be included.

**Affected Environment.** The document should show the location of, and describe, all vegetative cover types in the areas potentially affected by all project alternatives and associated activities. Tables with acreage of each cover type with and without the project for each alternative would also be appropriate. We recommend that all wetlands in the project area be delineated and described according to the classification system found in the Service's Classification of Wetlands and Deepwater Habitats of the United States (Cowardin 1979). The Service's National Wetland Inventory maps would be one starting point for this effort.

The document should present and analyze a full range of alternatives to the proposed project. At least one alternative should be designed to avoid all impacts to wetlands, including riparian areas. Similarly, within each alternative, measures to minimize or avoid impacts to wetlands should be included.

Lists of fish and wildlife species expected to occur in the project area should be in the document. The lists should also indicate for each species whether or not it is a resident or migrant, and the period(s) of the year it would be expected in the project area.

**Environmental Consequences.** The sections on impacts to fish and wildlife should discuss impacts from vegetation removal (both permanent and temporary), filling or degradation of wetlands, interruption of wildlife migration corridors, and disturbance from trucks and other machinery during construction and/or operation. These sections should also analyze possible impacts to streams from construction of outfall structures, pipeline crossings, and filling. Impacts on water quality, including nutrient loading, sedimentation, toxics, biological oxygen demand, and temperature in receiving waters should also be discussed in detail along with the resultant effects on fish and aquatic invertebrates. Discussion of indirect impacts to fish, wildlife, and their habitats, including impacts from growth induced by the proposed project, should also be addressed in the document. The impacts of each alternative should be discussed in sufficient detail to allow comparison between the alternatives.

The cumulative impacts of the project, when viewed in conjunction with other past, existing, and foreseeable projects, need to be addressed. Cumulative impacts to fish, wildlife, wetlands and other habitats, and water quality should be included.

**Mitigation Planning.** Under provisions of the Fish and Wildlife Coordination Act, the Service advises the U.S. Army Corps of Engineers on projects involving dredge and fill activities in "waters of the United States", of which wetlands and some riparian habitats are subcategories. Since portions of this proposal may ultimately require a Corps permit, the Service will subsequently be involved under the Coordination Act. Therefore, if you have not done so already, we suggest that you or your representative consult the Corps regarding onsite wetlands and related habitats that may fall under their jurisdiction, and include this information in the draft document. When reviewing Corps public notices, the Service generally does not object to projects meeting the following criteria:

1. They are ecologically sound;
2. The least environmentally damaging reasonable alternative is selected;
3. Every reasonable effort is made to avoid or minimize damage or loss of fish and wildlife resources and uses;
4. All important recommended means and measures have been adopted, with guaranteed implementation to satisfactorily compensate for unavoidable damage or loss consistent with the appropriate mitigation goal; and
5. For wetlands and shallow water habitats, the proposed activity is clearly water dependent and there is a demonstrated public need.

The Service may recommend the "no project" alternative for those projects which do not meet all of the above criteria, and where there is likely to be a significant fish and wildlife resource loss.

When projects impacting waterways or wetlands are deemed acceptable to the Service, we recommend full mitigation for any impacts to fish and wildlife. The Council on Environmental Quality regulations for implementing the National Environmental Policy Act define mitigation to include: 1) Avoiding the impact; 2) minimizing the impact; 3) rectifying the impact; 4) reducing or eliminating the impact over time; and 5) compensating for impacts. The Service supports and adopts this definition of mitigation and considers the specific elements to represent the desirable sequence of steps in the mitigation planning process. Accordingly, we maintain that the best way to mitigate for adverse biological impacts is to avoid them altogether.

The document should describe all measures proposed to avoid, minimize, or compensate for impacts to fish and wildlife and their habitats. The measures should be presented in as much detail as possible to allow us to evaluate their probable effectiveness.

Because of their very high value to migratory birds, and their ever-increasing scarcity in California, our mitigation goal for wetlands (including riparian and riverine wetlands) is no net loss of in-kind habitat value or acreage (whichever is greater).

For unavoidable impacts, to determine the mitigation credits available for a given mitigation project, we evaluate what conditions would exist on the mitigation site in the future in the absence of the mitigation actions, and compare those conditions to the conditions we would expect to develop on the site with implementation of the mitigation plan.

Mitigation habitat should be equal to or exceed the quality of the habitat to be affected by the project. Baseline information would need to be gathered at the impact site to be able to quantify this goal in terms of plant species diversity, shrub and tree canopy cover, stems/acre, tree height, etc. The ultimate success of the project should be judged according to these same measurements at the mitigation site.

Criteria should be developed for assessing the progress of the project during its developmental stages as well. Assessment criteria should include rates of plant growth, plant health, and evidence of natural reproduction. Success criteria should be geared toward equaling or exceeding the quality of the highest quality habitat to be affected. In other words, the mitigation effort would be deemed a success in relation to this goal if the mitigation site met or exceeded habitat measurements at a "model" site (plant cover, density, species diversity, etc.).

The plan should present the proposed ground elevations at the mitigation site, along with elevations in the adjacent areas. A comparison of the soils of the proposed mitigation and adjacent areas should also be included in the plan, and a determination made as to the suitability of the soils to support habitats consistent with the mitigation goals.

Because wetland ecosystems are driven by suitable hydrological conditions, additional information must be developed on the predicted hydrology of the mitigation site. The plan should describe the depth of the water table, and the frequency, duration, areal extent, and depth of flooding which would occur on the site. The hydrologic information should include an analysis of extreme conditions (drought, flooding) as well as typical conditions.

The plan must include a timeframe for implementing the mitigation in relation to the proposed project. We recommend that mitigation be initiated prior to the onset of construction. If there will be a substantial time lag between project construction and completion of the mitigation, a net loss of habitat values would result, and more mitigation would be required to offset this loss.

Generally, monitoring of the mitigation site should occur annually for at least the first five years, biennially for years 6 through 11, and every five years thereafter until the mitigation has met all success criteria. Remediation efforts and additional monitoring should occur if success criteria are not met during the first five years. Some projects will require monitoring throughout the life of the project. Reports should be prepared after each monitoring session.

The plan should require the preparation of "as-built" plans. Such plans provide valuable information, especially if the mitigation effort fails. Similarly, a "time-zero" report should be mandated. This report would describe exactly what was done during the construction of the mitigation project, what problems were encountered, and what corrections or modifications to the plans were undertaken.

The plan should detail how the site is to be maintained during the mitigation establishment period, and how long the establishment period will be. It will also be important to note what entity will perform the maintenance activities, and what entity will ultimately own and manage the site. In addition, a mechanism to fund the maintenance and management of the site should be established and identified. A permanent easement should be placed on the property used for the mitigation that would preclude incompatible activities on the site in perpetuity.

Finally, in some cases, a performance bond may be required as part of the mitigation plan. The amount of the bond should be sufficient to cover the costs of designing and implementing an adequate mitigation plan (and purchasing land if needed) should the proposed plan not succeed.

#### Reference

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. FWS/OBS-79/31. U.S. Fish and Wildlife Service, Washington, D.C. 103 pp.